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Stock Market Development and Economic Growth: The Jordanian Experience

by

Aktham Issa Maghyereh

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A thesis submitted to the University of Durham in candidature for the degree of
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Department of Economics & Finance

2001

17 SEP 2001

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Abstract

This is an empirical study of the neglected role of stock market development in the process of economic growth in the case of a particular developing economy-Jordan. In particular, this study evaluates the impact of stock market development on economic growth, and takes Jordan as a country-specific case study using both the macro- and micro-level data sets. Thus, the study uses an assortment of different data sets and empirical methodologies to assess the relation between the stock market and economic growth within a specific country's experience. As a result, this study provides some knowledge that might usefully be generalised to other developing counties, particularly to those with a similar economic structure.

The primary contribution of this study lies in the fact that it is the first attempt to study the impact of stock market development on the economic growth process of specific-country experience, in both the quantitative and qualitative senses. It is also the most comprehensive empirical study of finance-growth with respect to the role of the stock market in macro- and micro-level aspects.

The main aims of this study have been to answer the following questions:

(i) Does stock market development have any influence on economic growth in Jordan?

(ii) Is the stock market a leading sector in the Jordanian economy? Or is any feedback consequence effect of the economic growth generated elsewhere? Or is it a two-way causation?

(iii) Does stock market development facilitate the growth of Jordanian firms in terms of value added growth?

(iv) Does stock market development importantly influence Jordanian firms' financial structure choices?

(v) Does stock market complement or substitute for the banking sector in providing financial services to the Jordanian economy?

Chapters V to VIII of the study attempt empirically to answer these questions. The main findings are: First, stock market development has a significant effect on economic growth, and this effect remains strong even after controlling for banking sector and other control variables. Second, while the evidence largely supports the view that there is a stable, long run equilibrium relationship between the evolution of the stock market and the evolution of the economy, it provides no support for the view that the stock market is a leading sector in the process of Jordan's economic development. The evidence supports the view that the relation between stock market development and economic growth in Jordan is bi-directional. Third, the micro-level tests suggest that stock market development exerts a statistically significantly and economically large impact on the growth of firms'. More particularly, the evidence indicates that with more development in the stock market, firms that use equity finance heavily grow faster than firms that do not. Fourth, stock market development is a significantly and positively related to the debt to equity ratio of firms. Finally, all the findings described in this study support the view that the stock market and the banking sector in Jordan are complementary rather than substitutes in providing financial services to the economy.

Dedication

To my parents and to my beloved wife Rana for their understanding love and eternal support

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Chapter I
Precursors

1.1 Introduction

During the last decade the relationship between financial development and economic growth has become an issue of extensive analysis and debate. The question bears upon whether financial factors are important in influencing economic development. Academics have vastly different views on this issue. Some economists believe that the role of finance in economic growth is either unimportant or of second-order importance. Others believe that financial aspects play a key role in the growth process. For example, Lucas (1988) asserts that "*Economists badly over-stress the role of financial factors in economic growth*" (p.3), in contrast, Summers (1997) asserts that "*Financial markets don't just oil the wheels of economic growth...They are the wheels of economic growth*" (p.1).

That two such prominent economists could hold views so diametrically opposed to each other is rather startling to the casual observer. But such disagreements regarding the importance of financial development in economic growth are not new. Bagehot (1873) and Hicks (1969), for example, have argued that financial development played a critical role in England's industrialisation by facilitating the mobilisation of capital for "*immense works*". Bagehot (1873) observed "*we have entirely lost the idea that any underertaking likely to pay, and seen to be likely, can perish for want of money; yet no idea was more familiar to our ancestors, or is more common is most countries. A citizen of London in Queen Elizabeth's time...would have thought that it was no use inventing railways (if he could have understood what a railway meant), for you would have not been able to collect the capital with which to make them. At this moment, in colonies and all rude economies, there is no large sum of*

transferable money; there is no fund from which you can borrow, and out of which you make immense works" (p.4-3)[1].

Schumpeter (1912) and Patrick (1966) have argued that services provided by financial intermediaries are essential for promoting innovation in technology which has important growth effects. Fisher (1933) argued that one important factor contributing to severe economic downturn during the Great Depression was poorly performing financial markets. In Fisher's view, what made the economy so vulnerable was the high leverage of the borrowing class before the Great Depression. The deflation due to the recession redistributed the wealth from debtors to creditors and reduced the net wealth of the borrowing class. The downturn of real activity forced the borrowing class to cut expenditures or even go bankrupt, which, together with decreasing net worth, further enhanced the downturn of the real sector. Gurley and Shaw (1955) in their theory made a direct link between financial markets and real activity. Their theory stressed that financial markets can extend borrowers' financial capacity and improve the efficiency of inter temporal trade and they can pool investors' funds and provide external finance to producers. Therefore, financial markets are crucial to development because they enhance physical capital accumulation.

In contrast to the above views, Robinson (1952), for example, does not attribute a "*role*" to finance in development, arguing that economic growth creates a demand for financial services "*where enterprise leads, finance follows*"(p.86). His view implies that financial development is just a "*side-show*" of economic development and financial institutions play no significant role in economic growth. In addition, in the traditional Arrow-Deberu model of resources allocation, firms and households interact through markets, and financial intermediaries play no role. When markets are perfect and complete, the allocation of resources is Pareto efficient and there is no scope for intermediaries to improve welfare (see Friesen, 1979).

Practitioners, in contrast, have a remarkably consistent view of the importance of finance in the growth process. They consider the financial sector as a "*real sector*". The earlier studies in this field had been done by Goldsmith (1969), McKinnon (1973), Shaw (1973) and others,

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[1] This reference is quoted from Sinha and Macri (1999).

who found considerable evidence that financial intermediation is positively correlated with economic growth. But their work, though insightful, lacked analytical foundations. In traditional growth theory, financial intermediation could be related to the level of the capital stock per worker or to the level of productivity, but not to their respective growth rates; the latter were ascribed to exogenous technical progress.

The recent revival of interest in the link between financial development and growth stems from the insights and technique of endogenous growth models, which have mainly shown that there can be self-sustaining growth without exogenous technical progress and that the growth rates can be related to technology, income distribution and institutional arrangements. This provides the theoretical background that early empirical studies lacked: financial intermediation not only affects the level of the economy, but also the growth rate. The resulting models have provided new impetus to empirical research of the effects of financial development on growth and vice-versa. This body of literature, reviewed by Gertler (1988); Levine (1997); Bossone (2000); and Tsuru (2000), emphasises how functions exercised by financial intermediation, such as mobilising capital, helping to allocate resources, monitoring managers, and facilitating risk management, can affect economic growth.

However, most of the empirical literature on growth that explicitly models finance as an explanatory variable in the growth process restricts itself to financial intermediation done by the banking sector and ignores the role of the non-banking sector, *i.e.* stock markets. More particularly, these studies have used highly aggregated indicators of financial intermediation, such as the ratio of M2 or private sector credit to GDP. Academics and practitioners have ignored the role of stock markets on economic development for a long time. The role of stock markets in our everyday life has become rather difficult to ignore[2]. Recently, more attention has been given by the theoretical literature on the links between stock markets and economic growth, but the empirical evidence is still scarce. A primary reason for the lack of empirical literature on stock markets has been the absence of a standard set of indicators to measure the extent of market development.

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[2] A recent market crisis in East Asia has further whetted researchers' appetites to study the impact of financial development in growth.

The few empirical studies in this topic, however, perform cross-country growth regressions. Therefore, they do not explicitly confront the issue of causality. Stock market development may predict economic growth simply because it anticipate future growth; thus stock market development may simply be a leading indicator rather than a causal factor. In particular, this approach involves averaging out variables over long time periods, and using them in cross-section regressions aimed at explaining cross-country variables of growth rates. Therefore, this technique cannot allow different countries to exhibit different patterns of causality, yet it is likely that in some countries the stock market is a leading sector whilst in others it lags behind the banking sector. This means that the causality result is only valid on average. Thus, these researches have not completely resolved the issue of causality but suggest strongly that stock market development is an important determinant of future economic growth. The questions about causality remain unsolved: does stock market development affect growth, does economic growth lead to more stock market development, or both?

Furthermore, cross-country growth regressions suffer from a variety of errors: measurement errors, statistical errors and conceptual errors. There is no defensible view for including different countries in the same regression. Also, since various factors change during the time period of study (governments, policies, preferences and business cycles), hoping to capture all these changes by certain explanatory variables averaged over time is rather optimistic. Consequently, interpreting the coefficient derived from such studies is rather difficult. As with other cross-sectional studies, the coefficients are only suggestive of partial correlations. This approach also by averaging of value over long period of time is not able to distinguish whether or not the development of stock markets affect the long-term growth rate of the economy, or it just influence the short-term level of development. A country experiencing short period of rapid growth and no growth after is treated the same empirically as the one experiencing moderate growth over long period. In summary, we believe that in these studies there is no consensus judgement that stock markets cause growth and what evidence there is very much country-specific. Consistent with our view, the World Bank (1993) expressed that the economic policies are country-specific and their effectiveness depends on the effectiveness of the institutions which implement them.

By contrast, this study addresses some gaps in the existing empirical literature and examines the role of stock market development on economic growth in the small, developing economy of Jordan. More particularly, this study evaluates the impact of the stock market development on economic growth, and takes Jordan as a country-specific case study using both the macro- and micro-level data sets. Thus, we use an assortment of different datasets and econometrics methodologies to assess the relation between the stock market development and economic development within a specific country's experience.

The study of this important issue is timely because Jordan, as is the case in many other developing countries, is starting an ambitious program to improve the operation of the domestic stock market to be more effective in the economic growth process. However, there is no empirical evidence that provides policy makers with information concerning the particular causal patterns between the stock market development and the real sector in the economy. In addition, there are points of view that doubt the existence of a positive impact of the stock market on economic growth in small, developing countries like Jordan. The main reasons are to be found in market inefficiencies in developing countries. This makes it likely that stock markets will be more like burgeoned casinos than institutions designate to ameliorating and mobilising saving rates and enhancing investment decisions, technical innovation, and long-run growth. Thus, by choosing an individual country-Jordan, this study results will be more appropriate for policy decisions to developing economies in general and Jordan in particular. In addition, providing empirical evidence of this important issue within specific-country experience will add to the literature on the role of stock market development on economic growth and opens an exciting topic for research.

1.2 Motivation Issues and Objectives of the Study

The question arises here why we are choosing Jordan as our country case study. As with most developing countries, Jordan has a stock market. The Jordanian stock market (Amman Financial Market) was established in 1976 and started its first day of business on January 1, 1978. The establishment of this market was a major step on the path of developing the financial sector in Jordan so as to enable a better utilisation of a valuable resource through the

development of the sound capital market. It was established to contribute towards the capital raising and capital-allocating process which is so important in to strength Jordan's economy.

Since its establishment, the Amman Financial Market (AFM) has experienced an impressive development and become an important force in the financing investment in Jordan. Together with the Istanbul Stock Exchange, the AFM has become one of the leading capital markets of the Middle East. El-Erian and Kumar (1995) point out that, "*Jordan has a relatively highly developed equity market which plays an important part in the economic life of the country*" (p.146). Moreover, IMF (1995) asserts that, "*the AFM is one of the most active capital markets in the world*" (p.47). These views provide us the main motivation to study this market.

As with most stock markets, two main objectives lay at the root of the establishment of a stock market in Jordan. One goal is to devise a new mechanism for corporate finance in order to improve the process of fund allocation; the second goal is to improve information flows, both in the economy and in financial markets as a whole, so as to lower the costs associated with the flow of funds. Thus, the study will focus to analyse Jordan's stock market performance regarding the first objective.

Recently, in an important study Levine and Zervos (1998a) pose a question as to whether stock markets are merely burgeoning casinos where more and more players are coming to place bets, or whether stock markets are importantly linked to economic growth. A growing theoretical literature suggests that stock markets by promoting efficiency, reducing transaction costs, increasing liquidity, lowering risks, and transferring irreducible risks to those more willing to bear them, can influence the growth rate of countries. Hence, given an appropriate regulatory and institutional environment, stock markets can complement banks in not only generating funds, but also allocating capital optimally. The importance of stock markets stems from their ability to reduce liquidity and productivity shocks, and expand the information set at the disposal of the financial sector, both of which affect the marginal efficiency of capital which, in turn, influences output and its growth.

One of the significant roles of stock markets is that they provide a way of checking that firms are well run with optimal management techniques for operation. Under these circumstances,

investors have a vast interest in keeping tabs on management. If the management pursues a policy that is not compatible with the investor beliefs, this is reflected in the stock price and the stock price is thus representative of the turn value of the firm. Moreover, continuous adjustments of share prices impose control on the investment behaviour of these firms. In addition, stock markets can and do attract foreign portfolio capital. Much of this capital can be used to provide additional funds in the form of equity to the corporate sector.

However, another important strand of the literature stressed the negative impact of stock markets on the rate of investment, the time horizon of firms, international competitiveness, and economic development. They argued that even with well organised stock markets such as those found in the United States and United kingdom, the market does not in practice perform at all well its supposed monitoring, screening and disciplinary functions. The perceived failures of the pricing and takeover mechanism are thought to lead to the phenomenon of "*short-termism*" (Froot *et al.,* 1990).

In light of the somewhat divergent set of views among practitioners (including academics who subscribe an important role to finance in growth) and a large number of academic economists, this study reviews existing theories on the important of stock market in growth, organises an analytical framework for the study of the stock market and growth, and evaluates the quantitative evidence of the importance of the stock market development in economic growth within an individual country's experience. The focus on the empirical work derives from the preponderance of theoretical reasoning that exists in the literature as compared to the scarcity of empirical work on the subject as well as our believe that this issue is very much country-specific and the conclusions drive from one country or group of countries experience may not be bound to apply to other countries.

As mentioned before, the main objective of our empirical work is to investigate whether stock market development leads to economic growth in the small, developing economy of Jordan. We provide tests at both the macro- and micro-levels. More specifically, at the macro-level we mainly try to answer the following two questions:

- Does stock market development have any influence on economic growth in Jordan?

- Is the stock market development a leading sector in the Jordanian economy? Or is any feedback consequence effect of the economic growth generated elsewhere? Or is it a two-way causation?

At the micro-level we attempt primarily to examine the following two questions:

- Does stock market development facilitate the growth of Jordanian firms in terms of value added growth?

- Does stock market development importantly influence Jordanian firms' financial structure choices?

Recently, many of the debates in financial literature focus on the relative merits of stock markets versus banks. Many researchers stress the advantages that banks have over markets in financing country's growth. Others, however, emphasise the comparative merits of stock markets. Another argument argues that the stock market versus banks debate is of secondly importance. According to this view, both banks and stock markets arise to ameliorate information and transaction costs and thereby provide financial services that enhance economic growth. Furthermore, banks and stock markets might act as complements in providing financial services and promoting growth.

In light of the divergence of the above views, at macro-and micro-levels, in this study we also try to answer the following important question:

- Does the stock market complement or substitute for the banking sector in providing financial services to the Jordanian economy?

1.3 Contributions of the Study

This study makes the following contribution to the literature of stock market and economic growth.

- The primary contribution of this study is that it is the first attempt to study the impact of stock market development on the growth process of specific-country experience, in both the quantitative and qualitative senses[3]. Thus, the experience of Jordan in the development of its economy as well as its stock market presents an excellent opportunity to add the results of a country-specific study to the debate in the literature on the role of stock market development on economic growth.

- This study is the first to explicitly investigate the direction of causality (both at the short- and long-terms) between stock market development and economic growth.

- This study is the most comprehensive empirical study on finance and growth with respect to the role of the stock market in macro- and micro-level aspects.

- Unlike most previous studies this study extends and constructs simple empirical models to incorporate the effect of stock markets on growth taking into account other factors that may affect growth.

- Stock market development and growth are modelled and tested as endogenous. Earlier studies only treated and tested stock markets as an exogenous variable. Stock markets may develop in anticipate of financial needs of industries or firms. Furthermore, factors such as quality of the legal system, clearance and settlement issues, transparency and the inside information problems, taxation issues, accounting standards, liberalisation of restrictions on international flows, macroeconomic environments, saving and investment, the development of banking sector as well as non-banking financial institutions (pension funds, insurance companies, mutual funds and investment banks) are important eliminates for stock market development.

- Earlier studies base on cross-country regressions imply that countries as well as firms all countries have identical production functions. It is generally felt that the production function may actually differ across countries. This study addresses this shortcoming by

[3] Known by author.

focusing only on one country's experience; it also uses a panel data framework which allows for the differences in the production function across firms.

- Finally, unlike earlier studies in this field this study empirically emphasises the dynamic capital structure decisions of firms.

1.4 Structure of the Study

In order to study the issues mentioned above, the remaining chapters of this study are organised as follows. Chapter II gives a comprehensive analysis of the macroeconomic environment of Jordan. The chronic imbalances that the economy has suffered are analysed and assessed. In particular, this chapter highlights the performance of the Jordanian economy covering the recent economic history, economic growth, investment, inflation, fiscal policy, and external account. In addition, in this chapter special attention is paid to analysis the evolution of the financial system in Jordan.

Chapter III provides a historical account of the development of the Jordanian stock market, with analysis of the successes and failures encountered along the way. This chapter also provides a detailed analysis of the current development of the Jordanian stock market with respect to other emerging and advanced stock markets by using a wide number of stock market development indicators.

Chapter IV surveys the literature on the "*stock markets-growth nexus*" to put the research topic into perspective. The survey begins by looking at how the traditional theories of growth failed to recognise the importance of the financial factor in the growth process and demonstrates how the emergence of the endogenous growth literature changed the profession's views on factors affecting growth by allowing technical change to be modelled endogenously. The survey includes a main section on the functions of stock markets. In this survey we focus on ties between economic growth and the quality of the functions provided by stock markets which play critical roles in an economy. These functions include facilitating of liquidity, risk diversification, information production, corporate control and monitoring, capital mobilising, and transmission path for monetary policy. Then, we review the most important theoretical

literature that directly modelled the role of financial markets in economic development. Considering the debate in financial literature which hinges on the assumption that debt market and equity finance are substitutes for each other, this chapter finally includes a section discussing in detail the important of stock market vis-à-vis banks for the economic development in developing countries.

In Chapter V empirical tests at macroeconomic level are conducted to gauge the relationship between the stock market development and economic growth. More particularly, in this chapter we present a simple plausible framework for studying some elements of endogenous growth that relate to the main aspects of the functions of financial markets. Based on this framework, we extend a simple endogenous growth model in order to incorporate the effect of financial markets. Then, the model is estimated and tested by running Two-Stage-Least-Square (TSLS) regressions.

Since one of the basic purpose of this study is establishing the direction of causality between the stock market development and economic growth in the Jordan case, this study would not be complete without in-depth analysis of this issue, *i.e.,* whether the stock market is a leading sector in the process of economic development, or is any feedback consequence effect of the growth generated elsewhere, or it is a two-way causation. Using some of the latest time-series techniques, Chapter VI examines the causality issue. The causality tests are performed within a framework based on unit-root testing and cointegration.

Chapter VII investigates the interaction between stock market development and economic growth in Jordan using micro data. Specifically, in this chapter we provided a firm-level test of the hypothesis that the development of the stock market is an important determinant of economic growth in Jordan. Focusing on mobilising of capital, information production and monitoring roles of the stock market, in this chapter we conducted a simple dynamic empirical model in which stock market development affect firm growth through enhancing productivity growth within the firm. We used firm level panel data for a sample of Jordanian quoted companies covering the period 1988-98. With this panel data set we used the latest technique in estimating the dynamic panel model. Specially, we used both the difference and the system GMM dynamic panel estimators.

The different attributes of debt and equity make the development of markets that facilitate the issuance and trading of these instruments very important. As stock markets become more developed and as imperfections in the capital markets are removed, corporations will have greater access to a broader range of financial instruments. This increased access would be expected to affect the financial policies of firms, thus affecting firms' investment, profitability and productivity growth. Therefore, establishing evidence about the effect of the stock market on financial structure will add the second side to the relation between the stock market development and firms' growth. The financial literature has not addressed this issue of stock market development and firms' financial structure in great detail. However, as stock markets develop and as barriers to investment are removed, a priori expectation suggests that corporations will use more equity to debt in order to finance new growth. Using both the difference and system GMM estimators to estimate a dynamic adjustment model, Chapter VIII investigates the effect of stock market development on the financial choices made by the Jordanian firms during the period 1988-98. Specifically, in this chapter we attempted to answer the questions of how stock market development affects the ability of Jordanian firms to raise capital for new growth and how this development affects the capital structure choices these firms make.

Finally, Chapter IX summarises the results of the study and discusses some policy implications.

Chapter II

The Jordanian Economy

2.1 Introduction

Jordan is the creation of recent political events. Great Britain was established the country (originally called Transjordan) in 1921 as a semi-autonomous emirate within the framework of its mandate over Palestine. On May 25, 1946, Transjordan became an independent Kingdom allied to Britain. From April 1950, it became known as "*the Hashimite Kingdom of Jordan*" and consisted of two parts: that original part, originally known as *Transjordan,* and the eastern part of Palestine known as the *West Bank* (of the River Jordan). After the 1967 war, the West Bank was occupied by Israel, and Jordan retrieved its original state. It has a total area of 89,342 square km, consisting mainly of desert plateau in the east, highlands in the northwest, and the fertile rift valley along the west.

The World Bank classifies Jordan as a developing country. The Jordanian economy is by and large a market-based economy despite the fact that economic growth is of great concern to the Government. The relatively small size of the economy and its limited natural resources has forced Jordan to develop strong external economic and financial relations to cover its economic development needs. The level of economic activity in Jordan tends to be greatly affected by these relations. Important indications of this relationship are foreign trade with neighbouring Arab markets, foreign financial assistance (aid and grants), and remittances from Jordanian expatriates, particularly from the Gulf countries. The result of this dependence on external relations has been a vulnerability of the economy to exogenous factors beyond the control of the economy itself.

In addition to this peculiar set-up, the economy itself is characterised by the following: (i) structure problems, indicated by the low degree of complementarity among the various sectors, and extensive dependence on foreign markets for imports and exports; (ii) a chronic imbalance between budget revenues and expenditures, and the existence of a long-

standing budget deficit, although recently domestic revenues have managed to cover current expenditures; (iii) serious discrepancies between investment and national savings, leading to a significant dependence on external sources, mainly aid, grants and debt for financing investment; (iv) an imbalance between population density and growth and employment, resulting in structural distortion in the employment market.

This chapter traces the evolution of the Jordanian economy. More particularly, this chapter highlights the performance of the Jordanian economy covering, recent economic history, economic growth, investment, inflation, unemployment, fiscal policy, external account, and finally the development and structure of the financial system is analysed with special emphasis on banking sector operations. Thus, this chapter and next chapter provide the background for the empirical chapters which investigate the interaction between stock market development and economic growth in Jordan.

2.2 Recent Economic History

Jordan does not have a well-developed economy. It is a middle-income country of about 4.77 million inhabitants and an annual per capita income estimated at US$ 1552.5 in 1998. Jordanian economic structure is dominated by trade- and services-related activities; these account for more than two-thirds of GDP, and industry and agriculture account for the rest. Historically the country has relied on aid and remittances from Jordanians working overseas to support the economy. Because of its narrow production base, the economy is highly dependent upon imports, which represent over 50 percent of GDP. Some of the imbalances in the economy have stemmed from the huge waves of refugees which spilled into Jordan in 1948, 1967 and 1990/91. These population changes had a major structural effect on the economy, contributing to the increased urbanisation of the Jordanian population, and creating problems for the Government due to the high cost of providing adequate services.

The size of the public sector in Jordan is large in relation to the level of domestic economic activity. However, the public sector is not engaged in manufacturing activities; it is primarily limited to providing basic services (health and education), public utilities (water and electricity), and infrastructure support (mainly in the areas of transportation, communications, and irrigation).

From the early 1970s, Jordan's strategy was to develop itself as a provider of skilled manpower and trade-related services for the Arab countries. Accordingly, the authorities chose a strategy aimed at educating Jordan's youth to prepare them for employment in and around the region. At the same time, with the sizable amounts of worker's remittances and aid received from abroad, Jordan was able to maintain income and consumption at levels that exceeded those that could be expected from the available production capacity in the domestic economy (Owen and Pamulk, 1998).

Jordan's economic growth during the 1970s and through the mid-1980s was robust. Domestic prices were generally stable, with high inflation rates averaging 8 percent during the decade through the mid-1980s. As a result of high current expenditure, however, Jordan incurred large fiscal deficits that, excluding foreign grants, averaged more than 20 percent through the mid-1980s. These were largely financed by readily available foreign grants. Fiscal revenues remained highly dependent on international trade-based taxes, even though the revenue-to-GDP ratio increased to 25 percent of GDP by the mid-1980s. The domestic savings rate was relatively modest, with private sector savings offsetting large dissavings of the public sector. Investment remained at comfortable levels, at more than 30 percent of GDP, but much of the domestic private sector investment was directed towards housing construction. Despite an unusual import boom, the external current account remained in virtual balance during this period.

By the mid-1980s, the flow of foreign grants from Arab oil-export countries and inflows of workers' remittances started to decline in the aftermath of the oil price collapse. As a result, there was a rapid acceleration of external debt-services payments, which led to the emergence of serious financial imbalances. Moreover, the sharp increase in public sector debt-service payments further accentuated Jordan's medium-term fiscal imbalance. In response to an easing of credit stance and a large devaluation, the inflation rate started to accelerate to double-digit levels by 1988. In addition, Jordan's reserves had fallen to the equivalent of two weeks of imports (World Bank, 1994). At the same time, banks started to accumulate non-performing assets, leading to bank failures.

To address these difficulties, the authorities initiated corrective macroeconomic policies, including a large devaluation of the Jordanian dinar. The exchange rate, which had

remained fixed to the special drawing rights (SDRs) for more than twenty years up to the end of 1987, was depreciated by 21 percent in real effective terms in 1988. By that time, however, Jordan had become one of the most heavily indebted countries in the world (World Bank, 1989a), with its ratio of external debt to GDP increased to 164.3 percent of GDP by 1989.

In order to address the rapidly growing imbalances, in late 1988 and early 1989 the Government adopted a medium-term growth-oriented adjustment programme supported by the IMF and the World Bank. This was a necessary prerequisite to any rescheduling of debt. Jordan's economic and financial performance during the first two years of the adjustment programme 1989-90 was encouraging. The expansions in the net domestic assets of the banking system, the trade deficit, and the external current account deficit were kept below their respective programme targets, allowing the Central Bank of Jordan's foreign exchange reserves to exceed the programme target significantly in 1989. The budgetary situation also improved, although, owing to higher than expected interests on foreign debt, the overall budget deficit exceeded the programme target.

Following the exchange depreciation in 1988, the Government introduced a number of reforms in the exchange and trade systems and in interest rate policy. These included, in particular, abandoning the dual exchange rate system, which they had introduced as a temporary emergency; adopting flexible exchange rate management, with the Jordanian dinar pegged to a basket of currencies; abandoning the policy of supporting the inter-bank rate through intervention; freeing up interest rates, with both deposit and lending interest rates allowed to be freely determined by market forces; and phasing out non-tariff barriers in stages and replacing them with tariffs initially, to lower effective protection and foster a broadly neutral system of incentives. The Government also adopted a strategy aimed at obtaining debt relief through the rescheduling and lengthening of the maturity structure of debt and reducing the debt burden in relation to GDP.

In 1990 the Government continuous implemented various structural measures, including tariff reform and further interest rate liberalisation, and pursued flexible interest and exchange rate policies. However, the impact of the second Gulf War hit the Government's efforts and damaged the success of the programme, resulting in further imbalances in the economy as Jordan lost its major trading partner, Iraq, as well as other major local markets

in Kuwait and Saudi Arabia. Added to this, as a result of Jordan's stance in the conflict, around 350,000 Jordanian workers in the Gulf States were expelled. The economic difficulties reached a peak in 1990 when Jordan stopped servicing its debt. When the regional crisis ended in early 1991, the Government re-evaluated and resumed their adjustment and structural reform efforts. This led to the adoption of a second medium-term adjustment and structural reform programme beginning in 1992, supported by the IMF. Since the new structural adjustment programme was implemented, Jordan has recovered from the severe economic disruptions that were caused by the 1990-91 Gulf War. Exports, imports and inflation are all doing better than expected. The government budget deficit (excluding grants), reduced to below 10.7 percent of GDP in 1998 from 17.3 percent in 1989, contained credit expansion and lowered tariffs from an average of 35 percent in 1992-94 to its current level of around 21 percent. Jordan's trade balance, even through improving, is still poor, with a trade deficit of JD 1442.3 million in 1998 or 27.5 percent of GDP.

In 1995, the Central Bank of Jordan (CBJ) announced that it had pegged the Jordanian dinar to the US dollar at the rate of JD1.41 to the US$, in order to encourage local investors to switch from foreign currency deposits to dinar deposits, which would lead to increased accumulation of reserves. It is further worthy of note here, that many important reform measures during the period 1992-98 were adopted in order to liberalise markets in Jordan, and to remedy structural distortions in various economic sectors. Efforts to bolster confidence in the investment climate in the Jordan also continued through the ratification of the Companies Law, the Security Law, and the promulgation of a new regulation for promotion of non-Jordanian investment aimed at eliminating all restrictions on foreign investment. Undoubtedly, these structural reforms are an essential condition for keeping pace with the requirements of economic globalisation and integrating with the world markets. This is particularly important since Jordan signed the European partnership-agreement in November 1997. In addition, steps have been taken to join the World Trade Organization (WTO), through the lifting of all restrictions and controls on international trade[1].

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[1] In April 11, 2000 Jordan became a number of the WTO.

Furthermore, as part of its public sector enterprise reform, Jordan's Government has been implementing a privatisation programme. In fact, Jordan initiated such a programme in early the 1990s, but the government have been slow in implementing it. There are several reasons for this: a lack of political consensus about the desirability of privatisation, fragmented management of privatisation without a strong central direction, and social concerns especially about potential labour redundancies in the overstaffed public enterprise sector. The initial focus of the programme will be to secure new financing for infrastructure development, but the programme is also intended to raise enterprise efficiency. To achieve this, the Government is moving state enterprises into a commercial environment not only by reducing subsidies, but also by breaking old public monopolies.

2.3 Economic Growth, Inflation and Unemployment

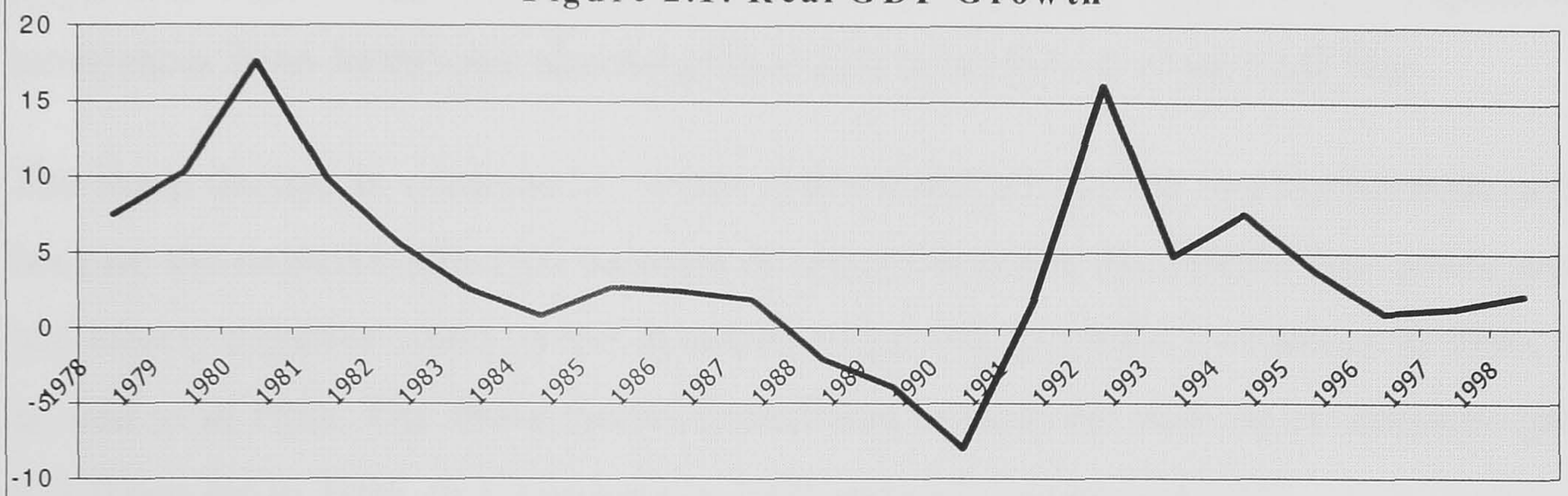
2.3.1 Economic Growth

As we have mentioned before, Jordan is not an oil-exporting countries: the oil booms in the mid-1970s and early 1980s were profitable for Jordan because oil-exporting neighbours were generous in the provision of grants and soft loans and in generating employment for Jordanians. During the 1970s and early 1980s Jordan's economy grew in excess of 10 percent per year, and investment averaged 35 percent of GDP. During this period, private investment was directed partly towards the construction of housing and partly towards the transportation and mineral-based processing sectors.

The steep decline in oil prices that had hit the world by the early of the 1980s caused a significant slowdown in the economies of the oil-exporting states, causing a decline in grants assistance and remittance income in Jordan. The growth of the boom years was not self-sustainable due to the excessive reliance on foreign assistance and foreign labour markets, and after a few years of accumulating costly foreign commercial debt, Jordan began to experience successive years of weak growth. In 1980, the real GDP increased by 17.6 percent, but this growth declined to 9.8 percent in 1981, and fell further to 5.6 percent in 1982 and to 2.5 percent in 1983. The growth rate slowed further to a low of 0.8 percent in 1984, recovering only somewhat in later years: 2.7 percent in 1985, 2.4 percent in 1986 and 1.9 percent in 1987 (see Figure 2.1).

Due to the Government's expansionary policy, in 1988 the Jordanian economy experienced an actual economic crisis with a rapidly growing debt and debt-services burden. With dwindling foreign reserves and an inability to service external debt, the Jordanian dinar was devalued in 1988 and again in 1989. Reflecting this deteriorating macroeconomic environment, aggregate investment declined to less than 22 percent of GDP. This economic crisis was manifested in the sharp decline in real GDP growth, when a negative growth rate of -2.1 percent was registered in 1988, which fell further to –3.9 percent in 1989, and to –8.0 percent in 1990.

Figure 2.1: Real GDP Growth



Source: Central Bank of Jordan, Monthly Statistical Bulletin, different issues.

In order to overcome this severe economic crisis and revitalise economic activity, Jordan had to shift its economic policy and started implementing a medium-term economic adjustment programme for 1989-1993. It aimed at correcting structural imbalances in the economy in both the balance of payments and the Government's budget while maintaining a reasonable growth rate. However, in 1990 the programme was severely interrupted by the Gulf crisis.

The restoration of economic stability in Jordan and political stability in the region in the last quarter of 1991 enabled the economy to achieve a moderate growth of 1.8 percent in real GDP, which was attributed to improved performance in the construction, trade and financial services sectors. However, Jordan had to overcome a problem of severe indebtedness. In 1992, Jordan adopted an amended economic adjustment programme for the period 1992-97. The macroeconomic policies which Jordan adopted in accordance with this adjustment programme, led to positive developments in the main economic indicators. The shift in economic policy became quite obvious after the lapse of the interruption caused by the Gulf crisis.

Accordingly, Jordan has rebounded in remarkable fashion, and economic performance has been impressive, aggregate investment recovered to reach about 35 percent of GDP in 1992. Real GDP rebounded by 16.1 percent in 1992- the highest in the Middle East and North Africa region. By 1993, GDP had grown by 5.7 percent against a regional average of 4.8 percent. The steady growth in GDP continued in 1994, as Jordan experienced an economic growth of 7.6 percent against a regional average of 2.0 percent[2]. In 1995, growth in GDP continued, this time at a rate of 3.9 percent. These successive years of strong growth were fuelled by a construction boom, a sharp increase in exports, strong rebounds in several other sectors from the recession of 1988-1991, and a major expansion of remittances from Jordanians returning home as a consequence of the Gulf War.

The sharp decline in construction sector activity and the decline in external trade activity because the negative effect on business disappointments in the Middle East peace process had clearly negative effect on the dynamics of growth in Jordan's economy in 1996, 1997 as well as in 1998. The above factors contributed towards the slowing of economic growth to 1.0 percent in 1996, to 1.3 percent in 1997 and to 2.2 percent in 1998.

It is worth noting here that the situation in Iraq continues to impact negatively on the Jordanian economy. The shrinkage of the Iraqi market due to economic sanctions has limited the capabilities of the private sector to export to what has been among Jordan's largest export areas. Further, inspections at the Port of Aqaba have hampered the flow of goods to Jordan and imposed delays on the receipt of inputs, thus causing production delays and making several Jordanian industries less competitive.

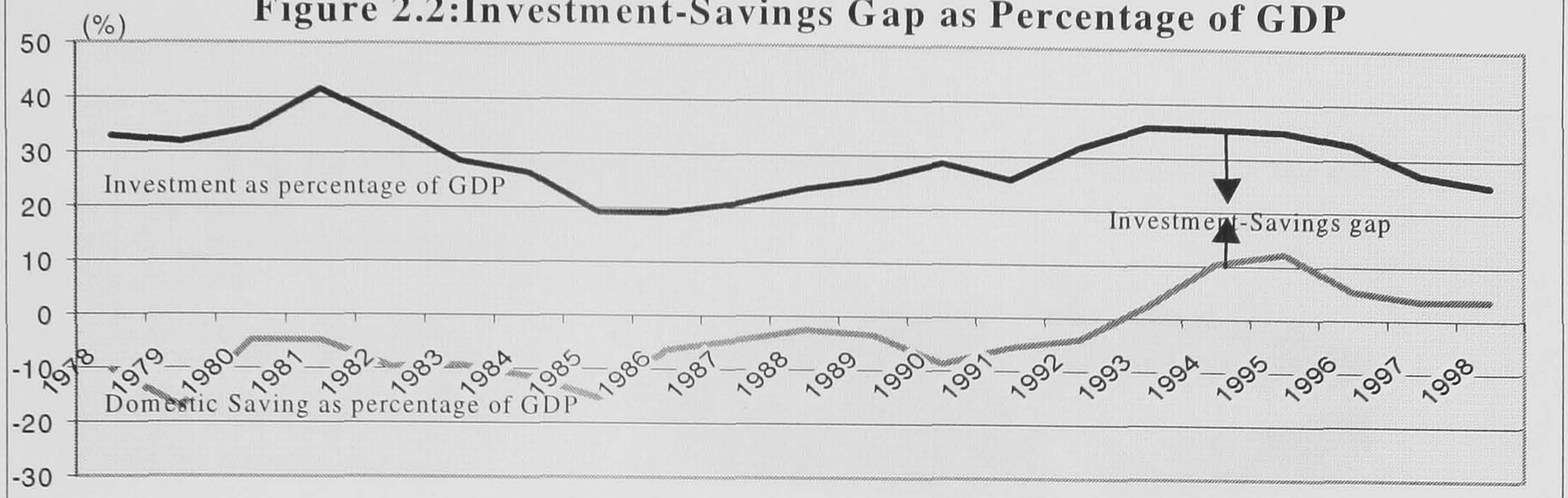
Overall, as shown above, Jordanian economic performance in the last three years- 1996,1997 and 1998- has been disappointing. The economy needed a persistent increase in investment to accelerate its growth. But the country has always been characterised by the failure of domestic savings to meet its investment, making investment and capital formulation even more difficult. Despite the significantly narrowed deficit gap between domestic savings and investment to 24 percent of GDP in 1998, compared with 28.4 percent in 1992 (see Figure 2.2), the gap is still considered wide, and is the principal manifestation of the structural imbalance confronting the Jordanian economy. This gap is

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[2] See United Nations (1995).

being financed through various sources, notably through remittances of Jordanians working abroad, external borrowing and official grants.

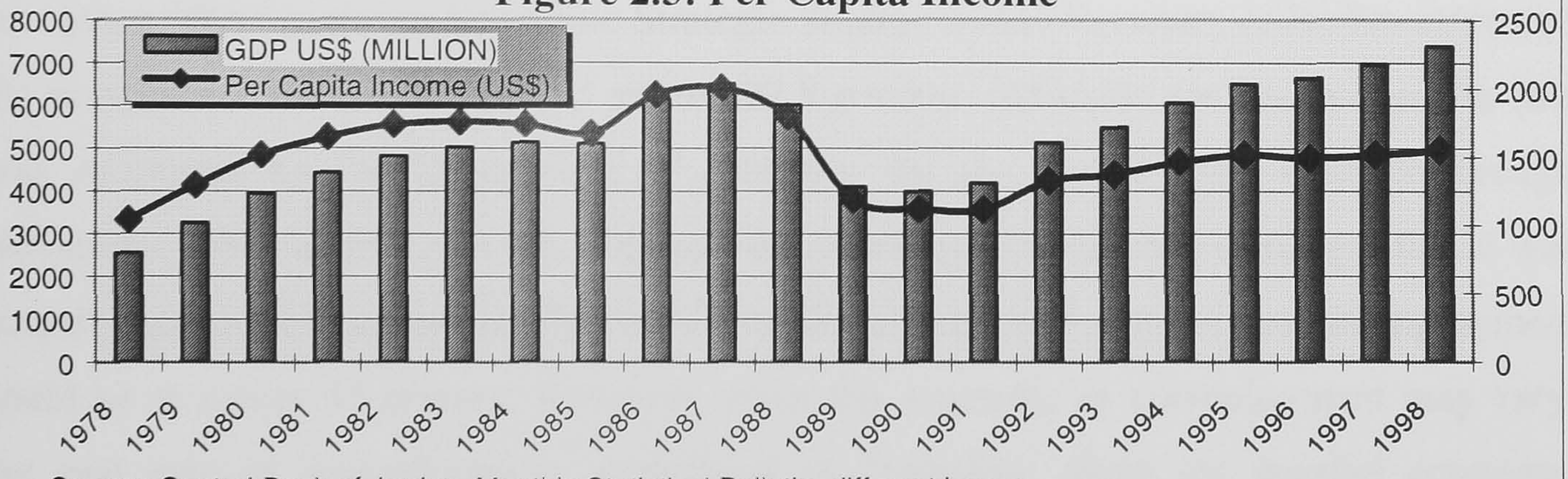
Figure 2.2:Investment-Savings Gap as Percentage of GDP



Source: Central Bank of Jordan, Monthly Statistical Bulletine, different issues.

In light of its per capita income, as we have mentioned above, the World Bank classifies Jordan as a middle-income country. A drastic fall of over 33 percent in per capita GDP was witnessed following the near collapse of the Jordanian economy and the financial crises in the late 1980s. However, fiscal discipline, structural reforms, and the investor-friendly laws of the 1990s all contributed towards a satisfactory recovery in per capita GDP (see Figure 2.3). This growth, however, was short-lived as Jordan fell back into recession at the close of the decade.

Figure 2.3: Per Capita Income



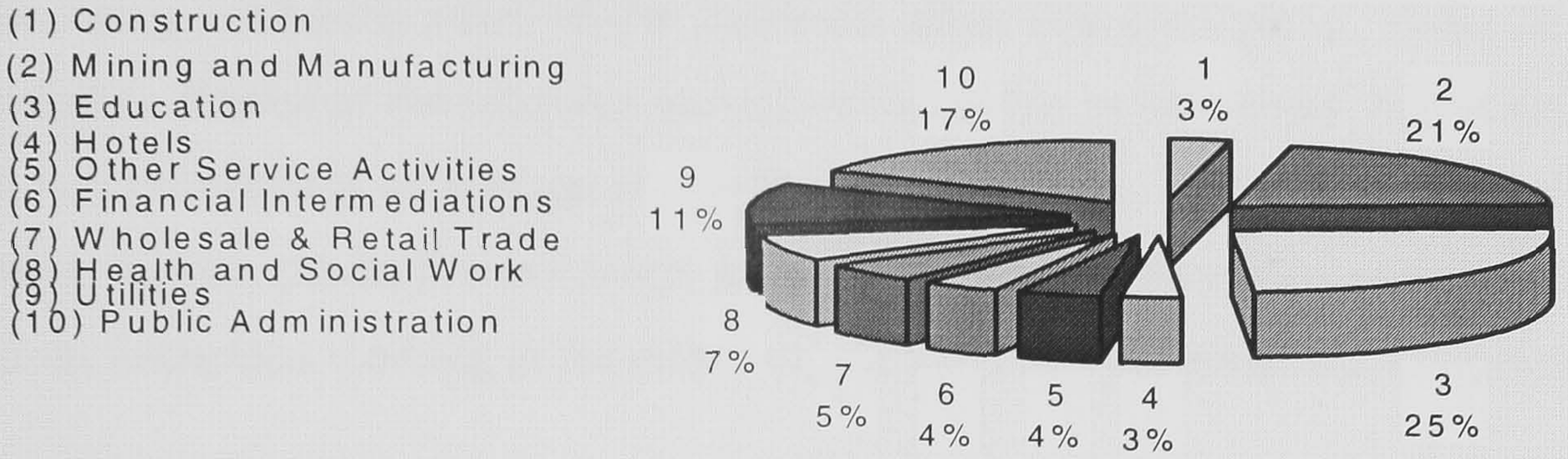
Source: Central Bank of Jordan, Monthly Statistical Bulletin, different issues.

2.3.2 Labour Force and Unemployment

According to available statistics, the total labour force in Jordan reached 1,031,797 in 1997, of which around 17 percent were civil servants. Employment is widely diversified across the various economic sectors. However, a significant number of employees in the education and health sectors are actually government employees on the payrolls of the

Ministry of Education and Ministry of Health, respectively. Around 21 percent of the labour force is employed in mining and manufacturing, whereas only 4 percent is employed in financial intermediation, despite Jordan's relatively large banking sector (see Figure 2.4).

Figure 2.4: Sectoral Distribution of Labour Force



Source: Department of Statistics, Statistical Yearbook, 1998.

A high rate of unemployment has been one of the banes of the Jordanian economy. With a large number of refugees entering the labour market at various times, Jordan has had to get used to a high level of unemployment. The unemployment rate increased from 9 percent in 1979 to 14.8 percent in 1987 to 17.1 percent in 1991 (Marashdeh, 1996). Throughout much of the 1990s, unemployment has remained relatively high. Following the Gulf crisis, unemployment reached 19 percent according to official estimates. This has not decreased significantly despite the Government's efforts to ease unemployment throughout the past few years. The Centre for Economic Strategic Studies at the University of Jordan estimated the unemployment rate in 1996 at around 27.5 percent. Officially the unemployment rate was estimated by the Department of Statistics for the period from October through November 1997, at 14.1 percent, although the Planning Ministry has estimated that it was actually around 15 percent (CBJ, 1997). Unofficial estimates suggest that unemployment could be at nearly 30 percent. However, while the estimates of unemployment may vary, the real rate of unemployment is difficult to determine given the parallel economy, employment in family businesses which falls outside tax reports, and underemployment.

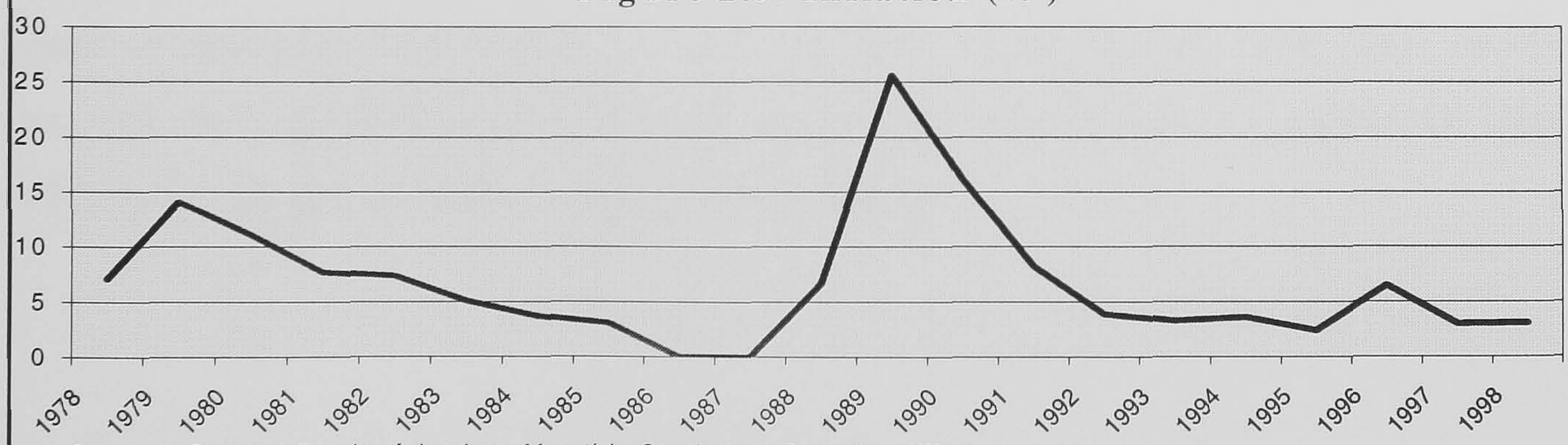
The higher rate of unemployment in Jordan is attributable to several factors: the high rate of population growth, the increase in migrant workers, and the mismatch between education and the needs of the economy. Indeed, all these are valid reasons, however, the absence of employment opportunities because of the lack of industries is actually the main reason for the high unemployment rate.

2.3.3 Inflation

Jordan experienced a relatively high inflation rate during the 1970s: it was estimated by the percentage change in consumer price index (CPI) at an annual rate of 8.3 percent. The influx of income from Jordanians working in Arab oil states, foreign aid from Arab countries, and high import prices were the major causes of higher domestic prices and the declining purchasing power of the Jordanian dinar during this period. However, the rate of inflation slowed as the economy moved into recession in the second half of the 1980s, and it was estimated at an average of less than 4 percent. This recession stemmed from at least three factors: the decline in foreign aid from the Arab oil producers, decline in remittances from Jordanians working in the oil states, and a decline in Jordanian commodity exports.

In 1989 and 1990, inflation increased dramatically to 25.6 percent and 16.2 percent respectively, as a result of the devaluation of the Jordanian dinar and the consequent inflationary effects associated with devaluation[3]. Since then, the control of inflation has been the main success story of the last few years (see Figure 2.5). The inflation rate dropped to 3.3 percent in 1993 and to 3.1 percent in 1998 with average rates over the past eight years of less than 4 percent. The increase in CPI in 1996 to 6.5 percent was due mainly to the reduction in Government subsidies and the increase in world food prices. The decrease in consumer prices is attributed mainly to the fact that the 1989 peak was a one-off event caused by the devaluation of the dinar, although the government continued to adopt economic stability policies aimed at controlling the growth rate of aggregate demand in order to contain inflationary pressures on the Jordanian economy.

Figure 2.5: Inflation (%)



Source: Central Bank of Jordan, Monthly Statistical Bulletin, different issues.

[3] Kandil (2000) examines the asymmetric effects of exchange rate fluctuations on real output and price in twenty-two developing countries including Jordan. She finds positive and statistically significant relation between currency depreciation and price inflation in Jordan (price inflation increases in the face of exchange rate depreciation).

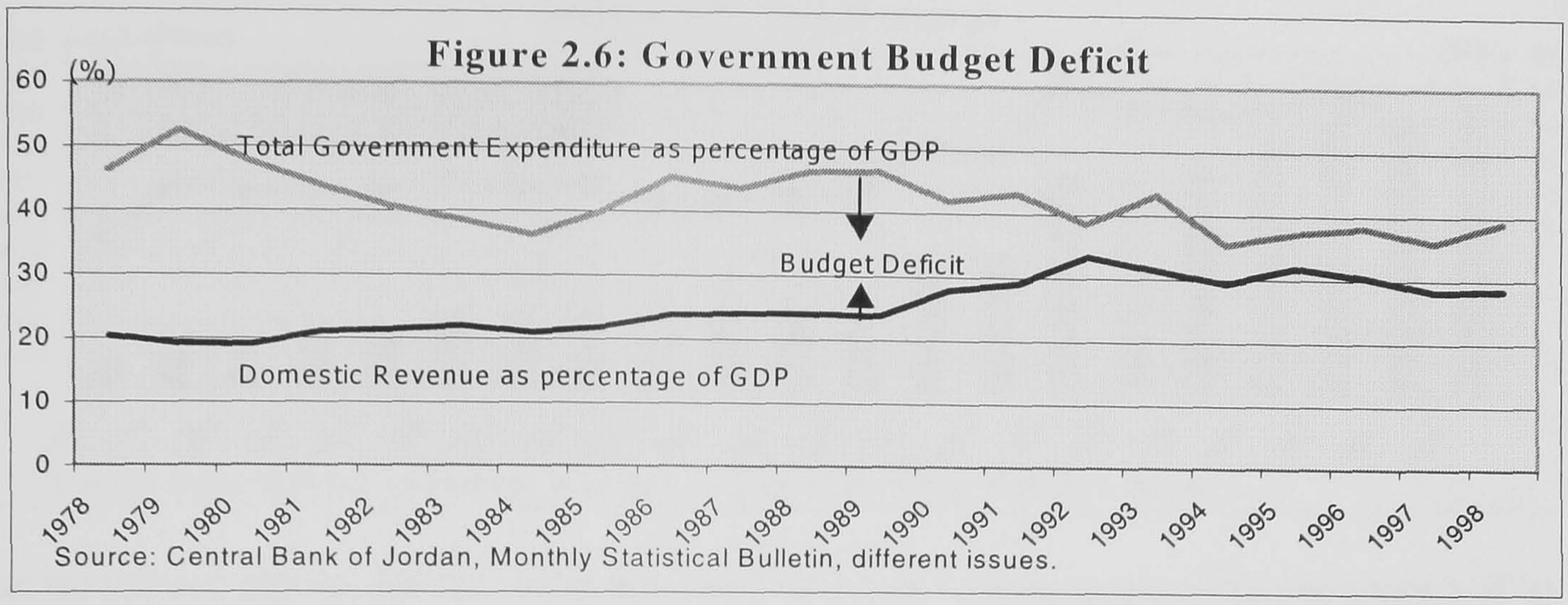
2.4 Public Finance

2.4.1 Fiscal policy

The public sector in Jordan has traditionally been very large. Government expenditure averaged about 42 percent of GDP during the period 1978-98. The Government provides modern services in various types of infrastructure, as well as in education, health care and other public services. Capital expenditure and the military, which together accounted for about 62 percent of total central outlays and 32 percent of GDP during the 1970s and early 1980s, were in large part financed from foreign grants.

Domestic revenue, which accounted for 22.2 percent of GDP on average between 1978 and 1988, was too low to finance the Government expenditure; moreover, its structure was unbalanced, with taxes on foreign trade providing nearly two-thirds of total tax revenue. Notwithstanding the sizable receipts of foreign grants, Jordan was unable to sustain the public expenditure programme; the overall fiscal deficit (including grants) averaged 10 percent of GDP during 1978-88, and made external borrowing necessary. Excluding grants, the overall deficit accounted for 21.9 percent of GDP at the same period.

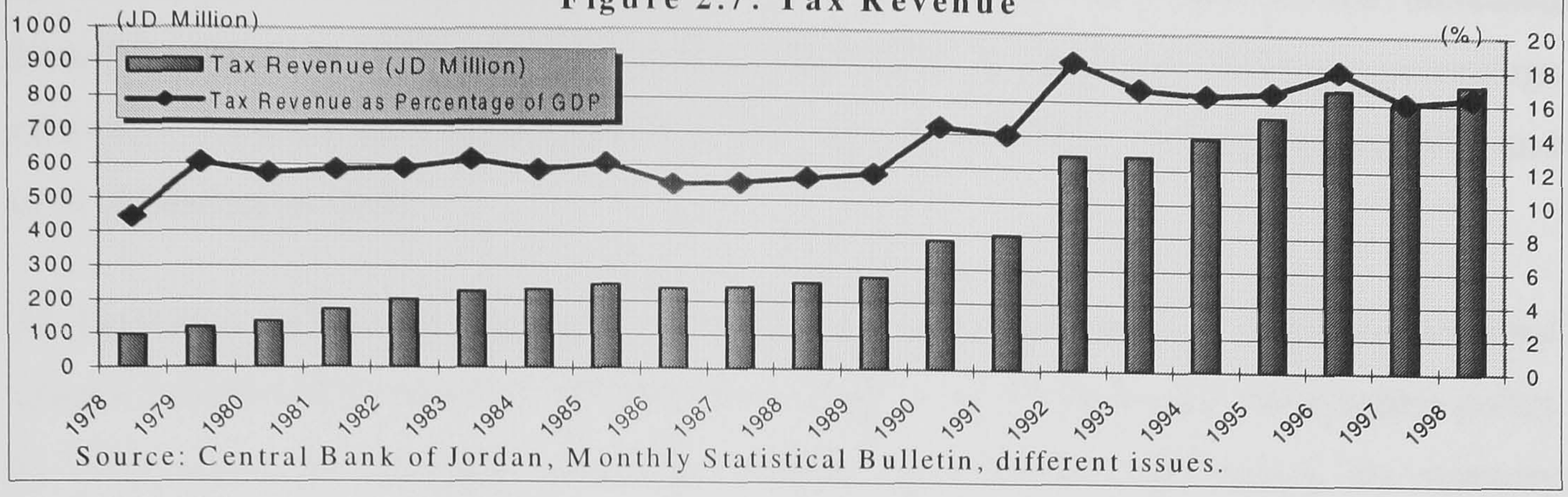
Following the near-collapse of the economy in 1988-89, Jordan turned to the IMF for supporting a structural adjustment programme to stabilise and restructure the economy. A component of the programme called for a tightening of the Government's fiscal policies which included restraining public expenditure, freezing public sector payrolls, and dramatically reducing subsidies. In addition, the programme called for a shifting of the sources of government revenue from income-based taxes to expenditure-based taxes in order to stimulate investments and savings. The results to date have been relatively positive, and the Government's budget deficit was reduced from 9.1 percent of GDP in 1992 to 6.8 percent of GDP in 1997 (see Figure 2.6).



However, controlling the budget deficit remains an ongoing and difficult challenge. The budget deficit for 1998 is estimated to amount to around JD 20 million, or around 8 percent of the GDP. This rise in deficit is largely as a result of an 11. 7 percent decrease in tax revenue due to the recession plaguing many sectors, particularly construction. In addition, current spending increased by 9.5 percent primarily due to large military and security expenditures.

Efficient tax collection methods, expenditure restraints, and debt service relief have all contributed towards a reduction of the fiscal deficit, although not to an appreciable extent. In a move to boost revenues, the Government implemented a strategy aimed at broadening the domestic tax base and making the tax system more simple and efficient. Prior to 1995, there were ten personal income tax brackets (with a top marginal tax rate of 5 percent), and five corporate tax rates based on a maximum for both personal and corporate income taxes. Corporate income taxes have been, by and large, standardised, with a marginal tax rate of 15 percent for industrial companies and 25 percent for service companies, although tax rates for banks remain as high as 35 percent. Export earnings are exempt from tax, but customs duties remain high. In addition, a general sales tax of 10 percent was introduced to replace the complicated consumption tax. As a result, tax revenues increased from 11.5 percent of GDP in 1989 to around 16 percent of GDP in 1998 (see Figure 2.7).

Figure 2.7: Tax Revenue



Source: Central Bank of Jordan, Monthly Statistical Bulletin, different issues.

As mentioned before, Jordan has historically relied on foreign grants to finance much of its current expenditure. However, in recent years, Jordan's reliance on international aid has significantly decreased. Foreign grants as a percentage of GDP have been reduced from a level of around 16 percent in 1989 to around 5.1 percent in 1998. As a percentage of central government expenditure, foreign grants have also been reduced from a level of around 34.4 percent in 1989 to around 13 percent in 1998.

2.4.2 External Debt

As mentioned above, Jordan's economy lacks abroad spread of earnings and has had to depend principally upon the remittances of workers overseas and foreign aid to supplement government reserves. In the late 1980s, foreign aid, remittances and tourist revenues accounted for over 60 percent of current receipts (World Bank, 1994). This is a huge imbalance for any economy.

The steep decline in oil prices that hit the region in the first half of the 1980s caused a significant economic slowdown in the oil-exporting states, which meant that grant assistance and remittance income declined sharply in Jordan. Despite the ensuing substantial reductions in remittances and foreign aid, the Government attempted to maintain their domestic economic policies unchanged during the period 1984-88. Instead of adjusting to the lower financing available, the Government resorted to external borrowing in order to finance the deficit in the Government budget and the balance of payments. After a few years of accumulating costly foreign commercial debt, the Jordanian economy had begun to experience an actual economic crisis with high debt and debt-services burden. With an external debt amounting to JD 4,317.9 million or the equivalent of US$ 6,088 million (109.8 percent of GDP) by the end of 1988 compared with US$ 1,900 million in 1980 (less than 53 percent of GDP), Jordan had become one of the most

heavily indebted countries in the world. Also the debt service as a ratio of GDP increased from 5.9 percent in 1980 to 22.1 percent in 1988 and to 34 percent in 1990; as a percentage of exports the debt service increased from 1.8 percent in 1980 to 49.7 percent in 1988 and to 50.5 percent in 1990.

As payments difficulties emerged, and as part of an overall strategy to achieve external current account adjustment, the Government initiated an external debt-management policy in 1989 aimed at obtaining debt relief through rescheduling, lengthening the maturity structure of debt, and reducing the debt burden in relation to GDP over the medium term. However, the 1990/91 Gulf crisis severely aggravated Jordan's external situation because of the loss of export markets for goods and services in neighbouring countries and the loss of foreign aid. Moreover, there was a sharp reduction in remittance flows, largely resulting from the massive return of Jordanians who had been working abroad. In the event, Jordan was unable to discharge its external debt-service obligations and made payments only to official creditors. The Government were aware that Jordan was unable to normalise payments relations with its creditors through regular debt servicing in cash and that exceptional financing through restructuring of the debt and debt service payments was necessary. Its also become clear that capitalisation of the unpaid debt-service obligations would lead to a build-up of external debt and that growth in debt service would exceed the growth potential for external current account receipts, making the overall situation unsustainable in the medium- to long-term (Alonso-Gamo and Mansur, 1996).

The situation called for the Government's immediate revision of its debt management strategies and accordingly, Jordan negotiated with both the Paris Club and the London Club to reschedule the debt. The Government was successful in reducing its debt with the London Club through judicious buy-back agreements which took advantage of heavily discounted rates. In 1993, Jordan and the Paris Club replaced a year-by-year agreement with a three-year rescheduling accord. In 1997, the accord was extended, and Jordan received its final debt rescheduling from the Paris Club.

Debt rescheduling has provided some cash-flow relief, but has not decreased the stock of debt to an appreciable extent. However, as a result of decreased new borrowing, debt buy-back, and debt swaps, external debt as a proportion of GDP had fallen steadily to around

96 percent by the end of 1998. Also the debt service ratio had fallen to manageable levels of less than 21.4 percent of export earnings in 1998 (see Table 2.1).

Table 2.1: External Debt and Debt Burden (1988-1998)

Item	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Disbursed External Debt (JD million)	4318	4462	3801	4958	4577	4230	4338	4465	4722	4580	5009
Debt Burden (JD million)	871	924	890	859	966	857	606	642	672	611	550
As a percentage of GDP (%)											
Disbursed External Debt	109.2	164.3	143.9	179.8	143	111.3	102.9	96.7	99.2	91.6	96.7
Debt Burden	22.1	34	34	31.4	30.2	22.5	14.4	13.9	14.1	12.2	14.8
As a percentage of exports (%)											
Debt Burden	49.7	55.5	50.5	48.1	50.5	43.9	29.1	26.4	25.9	24.1	21.9

Source: Central Bank of Jordan, Monthly Statistical Bulletin, different issues.

2.4.3 Privatisation

Since its inception in the mid-eighties, privatisation has acquired an increasing degree of importance, and has been considered by many in Jordan as an indicator of a new economic direction. However, although there has been a growing recognition of its need and desirability, privatisation in Jordan is less advanced than originally expected. Despite a heightened awareness of the excessive size of the public sector in Jordan and its increasing inefficiency over the years, rhetoric on privatisation has far exceeded action.

The extent of public involvement in economic activities in Jordan can be summarised in two different areas of intervention. The first is the direct involvement of the public sector through the actual production of goods and services. Public enterprises in Jordan are concentrated in five major sectors: water, electricity, transport, telecommunications, and mining. In most cases, such enterprises enjoy monopoly status. This is particularly true of electricity generation and distribution, mining (phosphate and potash), and telecommunications.

The second area of public involvement and participation in economic activity in Jordan is through direct equity shareholding by the central government. This is carried out through the Jordan Investment Corporation (JIC), the investment arm of the Government. In 1998, the JIC held shares in around 20 companies listed in the Amman Financial Market (AFM), with an approximate market value of around JD 464 million, accounting for around 11 percent of total market capitalisation.

In order to facilitate the process of privatisation in an efficient and transparent manner, the Executive Privatisation Unit was established at the Prime Ministry to coordinate the preparation of privatisation transactions based on comprehensive guidelines and regulations. The Unit also manages the marketing efforts of enterprises being privatised, executes transactions, and negotiates with the concerned parties.

The Government has recognised that the fiscal burden caused by subsidising public sector enterprises and specific Government services would be a drain on the financial resources needed to sustain the impressive economic performance experienced during the last few years. This is particularly true since part of these resources was planned to be in the form of external borrowings, leading to a rise in the external debt of the already heavily indebted country. In addition, the Government has concluded that, in light of the limited government funding sources for investment in infrastructure, it is necessary to mobilise private financial resources. Privatisation, therefore, is considered to be important as a vehicle to accelerate the mobilisation of resources for investment in infrastructure. The Government has used the following two methods: first, sale of privatisation candidates in the utilities sector to strategic, or anchor, investors to bring in immediate revenues for investment in infrastructure; and second, linkage of the sale to mandatory investment requirements, where strategic investors must commit themselves to provide new investments during a specific period of time in order to expand and improve services (Gupta, 2000).

In addition, there are other equally important factors behind the Government's drive for privatisation: First, privatisation is expected to reduce the financial burden on the Government budget caused by regular subsidies to public sector enterprises. By releasing scarce financial resources, the Government will be able to increase investment allocations to sectors that directly benefit the poor, such as education, nutrition and health. Secondly, privatisation will improve the efficiency of public sector enterprises, which have not only been performing poorly, but have also been highly resistant to change despite almost continuous reform efforts. Finally, privatisation will bring in the investment resources needed for the modernisation of the public sector.

The Government, however, has indicated that privatisation in Jordan will not necessarily be limited to the sale of the assets of public sector enterprises to the private sector, *i.e.*, changing ownership of public sector enterprises, but that other methods are also under

consideration. For example, the privatisation of the Alai Gateway Hotel and the Duty Free Shops at Queen Alia International Airport was carried out by means of the commercialisation of the former and the corporatisation of the latter.

1998 was an important year for privatisation in Jordan, both in terms of successes and failures. In November 1998, the Government closed the sale of 33.09 percent of the Jordan Cement Factories Company to Lafarge of France. The sale was worth JD 72 million, priced at JD 3.6 per share. Also, in the same year, the Government delayed the sale of the Jordan Telecommunication Corporation, following a decision by Southern Bell Corporation of the US to withdraw from the final bidding. This left Cable and Wireless of the UK as the only remaining bidder from the four which had originally shown genuine interest. Another important privatisation was initiated for the proposed restructuring and sale of the national airline, Royal Jordanian (RJ). The financial advisory mandate had originally been awarded to Citibank, but negotiations collapsed following disagreements between the Government and Citibank on matters relating to indemnification. Banque Paribas of France has since signed a contract to advise on the restructuring and privatisation of RJ.

Despite all the positive points that have just been discussed, up to now the privatisation process has not been smooth. There are, as a World Bank report argues, some key issues that still need to be addressed[4]. These issues, and the policy action expected, are as follows: First, a lack of broad public participation in privatisation. To establish such participation, the Government intends to combine the sale of shares to a strategic investor with a public share offering. Secondly, the involvement of foreign investors. There is a concern that privatised public sector enterprises may fall into the hands of foreign investors. This, it is argued, will give control over public sector enterprises to foreigners, reduce the economic sovereignty of the country and make its economic activities even more vulnerable. To avoid such a development, the Government is expected to require foreign buyers to have local partners. The Government itself also intends to introduce the so-called "*golden shares rule*" in order to acquire a voice in the decision-making process of the privatised public sector enterprises. Finally, the limited absorptive capacity of the AFM. This, however, is not considered to be a real concern. Subscription to shares of privatisation candidates usually takes place at the financial institutions which issue the

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[4] World Bank (1995). Jordan privatisation note. The World Bank; Washington, D.C.

privatisation equities on behalf of the privatisation candidates. Commercial banks, by virtue of their dominance in the AFM, can buy ailing public sector enterprises and resell them after readjusting their financial and administrative structures. This is expected to accelerate the privatisation process, especially for public sector enterprises which cannot be offered for sale through public subscription. The banks can also raise funds for public sector enterprises, through implementing reform programmes for their affiliated companies, as a first step towards privatisation. Moreover, the banks, as a means of supporting the privatisation process, can expand the margin of their finance mechanisms by developing investment trustee services regarding buying and trading shares.

Table 2.2:Major Privatisation Deals in Jordan

Company	Date	Size & Type of Privatization
Jordan Hotels and Tourism	Jan. 1995	JIC sold its 87% shareholding to Zara Investment
Arab Potash Company	April.1995	JIC Two thirds of the Company's authorised capital came from 6,000 private investors
Jordan Tobacco and Cigarettes	Sept. 1996	JIC floated 40,000 shares on the AFM
Jordan Paper and Cardboard	Sept. 1996	JIC floated 587,00 shares on the AFM
Jordan Co. for TV, Radio and Cinema Production	Feb. 1996	JIC announced its intention to sell 75.7% of its stake
Jordan Tourist and Spa Complex	Feb. 1996	JIC announced plans to sell 78% of the company
Jordan Food Processing	Feb. 1996	JIC announced its intention to sell 77% of its stake
Jordan Glass Industrial Company	June 1996	Shareholders voted to liquidate the firm. JIC, which owns, 60% had been attempting to sell its stake since 1994
Jordan Electricity Authority	Aug. 1996	Converted into a company owned fully by the Government and capitalised at JD500 million in anticipation of privatisation
Jordan Holiday Company	Aug. 1996	JIC sold 33.7% of the company's share to a private Jordanian investor
Arab International Hotels Company	Dec. 1997	JIC shareholding diluted due to capital increase
Jordan Cement Factories	Nov. 1998	JIC sold 33.09% of its holdings to Lafarge of France
Jordan Tourism and Spa Complex	Dec.1998	JIC leased the complex to Accor and Arm companies

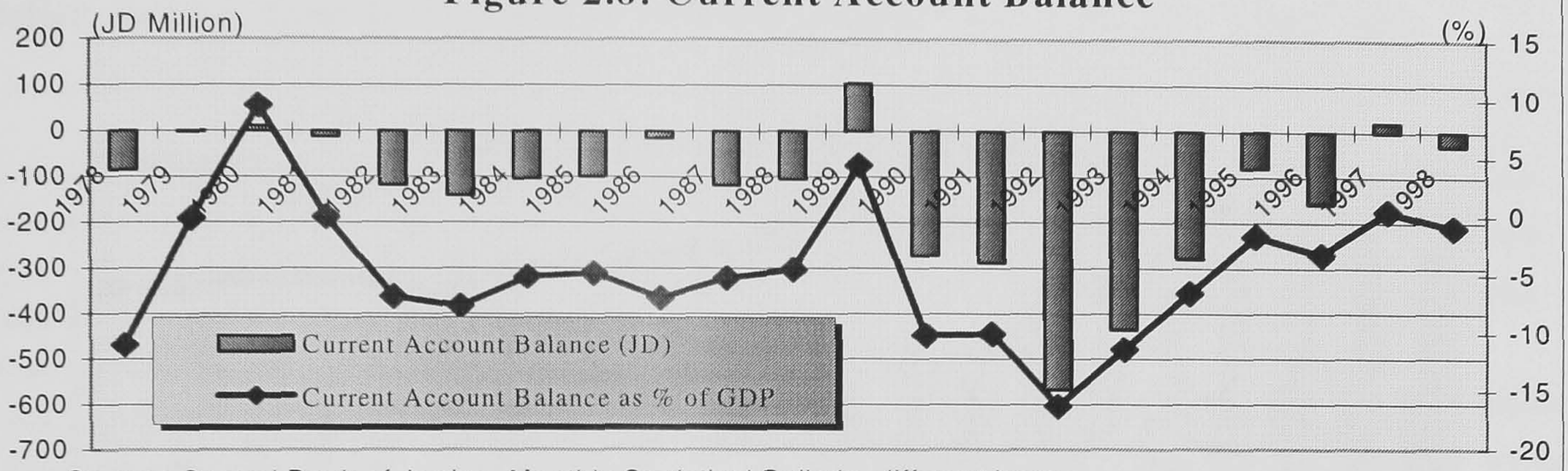
Source: Jordan Investment Corporation

2.5 External Account

Jordan's external economy has been perpetually under pressure from a large structural trade deficit. Income from expatriate remittances helped with the price of oil in the mid-1980s but with the subsequent slowdown in the regional economies, the current account moved heavily into deficit. This was particularly evident in the early 1990s when the current account deficit increased to around 16.3 percent of GDP. The deficit has been

gradually diminishing, and in 1997, the country registered a surplus of around JD 20.8 million. It is estimated that Jordan's current account balance slipped back into a deficit of around 1.0 percent of GDP in 1998 largely as a result of a fall in workers' remittances (see Figure 2.8).

Figure 2.8: Current Account Balance



Source: Central Bank of Jordan, Monthly Statistical Bulletin, different issues.

2.5.1 Trade Balance

The deficit in the trade balance is considered to be one the basic characteristics of the Jordanian economy. It has been suffering from a chronic trade deficit of an increased magnitude as commodity imports have substantially surpassed visible exports. This has been a result of Jordan's relatively narrow export base and its heavy reliance on imported consumer goods and energy products. Despite the devaluation of the Jordanian dinar, which made Jordanian goods more attractive internationally, and trade liberalisation policies which sought better to integrate the Jordanian economy with the world, the practice of curtailing imports and stimulating exports has met with little success. Although exports and imports have grown by 72 percent and 52 percent respectively since 1990, this has not had much effect on the trade deficit. This is due to an import bill which has historically been around twice as high as export earnings. Historically, merchandised trade deficits have been financed by remittances from Jordanians working abroad, foreign aid, external borrowing and a considerable draw down of foreign exchange reserves.

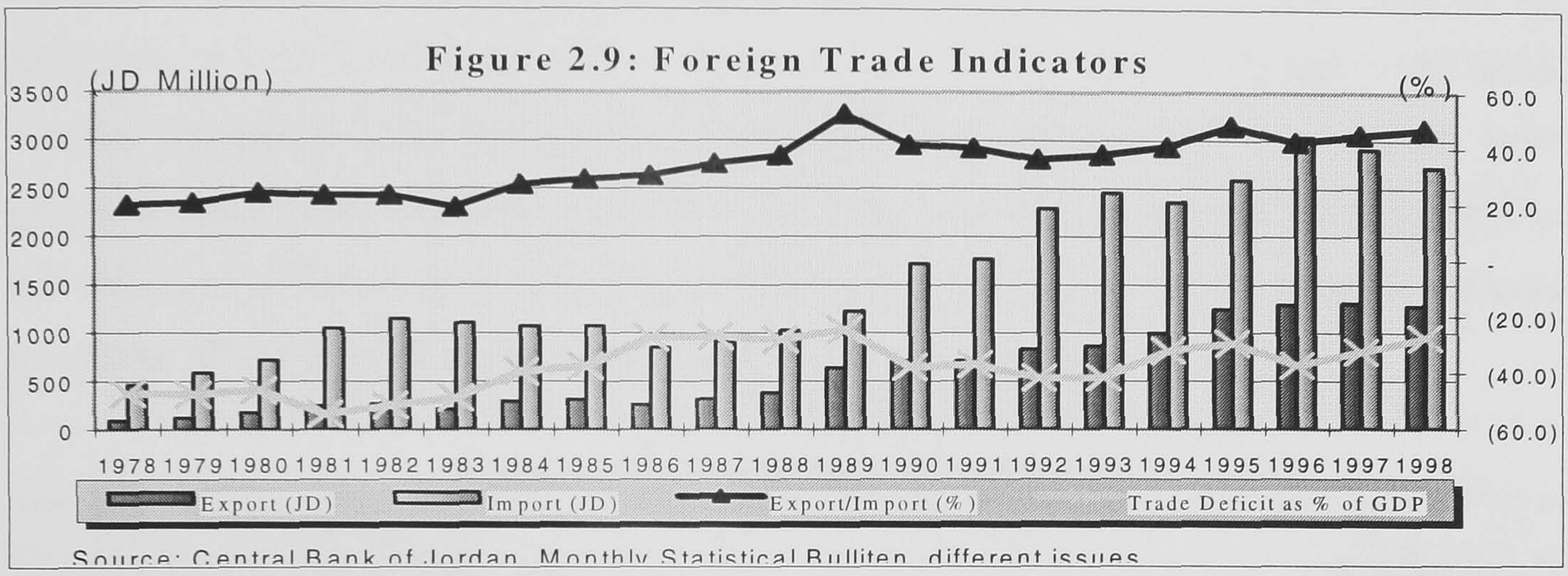
Jordan's external commodity trade has been expanding rapidly. Commodity exports increased significantly from JD 90.9 million in 1978 to JD 1275.6 million in 1998, at an average annual rate of 13.5 percent[5]. On the other hand, commodity imports increased

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[5] World Bank (1996) classified Jordan within "*fast growing exporters*" developing countries.

from JD 458.9 million in 1978 to JD 2,717.9 million in 1998, at an average annual rate of 8.8 percent. The share of commodity exports in financing commodity imports increased from 19.7 percent in 1978 to 46.9 percent in 1998. However, exports have not been able to cover imports and this has led to a trade deficit of an increasing magnitude, rising from JD 368.0 million in 1978 to JD 1442.3 million in 1998. As a percentage of GDP, the trade deficit declined from 47.2 percent in 1978 to 27.5 percent in 1998 (See Figure 2.9).

Figure 2.9: Foreign Trade Indicators



Source: Central Bank of Jordan, Monthly Statistical Bulliten, different issues

Export diversification has increased in recent years as Jordan has moved away from traditional crude material exports and focused on value-added manufactured products. Although phosphates and potash continue to be the country's major exports- representing around 25 percent of total exports in 1998- manufactured products such as pharmaceuticals account for an increasing share of Jordanian exports. This trend toward a more diversified export base is encouraging, especially as Jordan prepares to integrate formally into the global economy through WTO membership.

Manufactured goods, mainly consumer products, continue to be one of Jordan's major imports. However, machinery takes up the lion's share of imports as a result of Jordan's drive toward building up a capital intensive manufacturing base and the Government's large expenditures infrastructure.

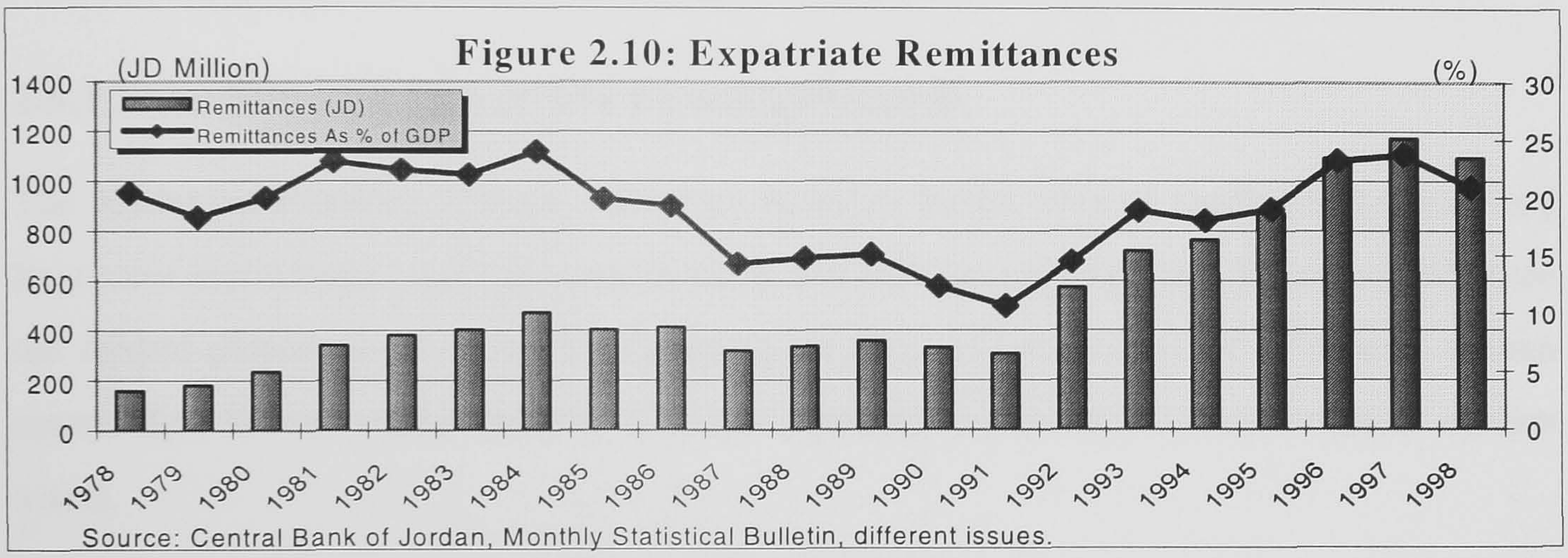
2.5.2 Expatriate Remittances

While Jordan has experienced a continuous merchandise trade deficit over the years, it has enjoyed a growing trade surplus in services. The country has become a major exporter of skilled labour whose remittances are the primary reason behind the improved current account balance. Expatriate remittances currently account for over 77 percent of the total

services balance surplus. It is estimated that some 800,000 Jordanians currently work abroad, and remittance continues to be channelled to Jordan because many of the expatriates have dependants at home who rely on them to supplement their income.

As a percentage of GDP, expatriate remittances increased from 20.4 percent in 1978 to 24.0 percent in 1984. As a result of collapse in oil prices, in the mid-1980s, the flow of expatriate remittances started to decline to reach 14.8 percent in 1988. Despite the expulsion of over 350,000 Jordanians many remained in the lower Gulf region and Saudi Arabia, and many more have retired or are returning. Consequently, remittances have grown steadily from their low of JD 306.3 million, or at 10.7 percent of GDP in 1991 to around JD 1173.5 million or to 23.7 percent of GDP in 1997. In 1998, remittances declined to around JD 1093.8 million or to 20.9 percent of GDP (see Figure 2.10).

Figure 2.10: Expatriate Remittances



Source: Central Bank of Jordan, Monthly Statistical Bulletin, different issues.

2.6 Financial System

Many studies mentioned that Jordan has a very well developed financial sector. Among these studies, Beck, *et al.,* (1999a) and Demirguc-Kunt and Levine (1999) examined the financial development and financial structure for up to 150 countries. They have used a wide variety of indicators that measure the size, activity and efficiency of financial intermediaries and stock markets. Their papers provide international comparisons regarding economic development and bank, nonbank, and stock market development. According to their analysis, Jordan is classified among countries that have a well-developed financial system or among countries that have financially developed economies[6].

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[6] See further Wilson (1995); Abu-Jabarah (1993); ESCWA (1997); Cobham (1995); Kinght (1998) and others.

Over the last two decades, Jordan's financial system has expanded considerably as evidenced by the increase in the ratio of financial assets to GDP from about 80 percent in 1970 to over 200 percent in the late 1990s. Jordan's financial system is very deep compared with other emerging market economies as well as with developed economies[7]. The monetisation of the economy led to a complementary rise in credit. Credit to the private sector stood at 82 percent of GDP at the end of 1998, up from 36 percent in 1978. The Jordanian system is also bank-oriented, with more than 90 percent of financial assets in banks, and with limited financial intermediation through mutual funds and other types of institutional investor. The establishment of the AFM in 1978 for trading in securities further enhanced the official performance of the financial system. Since its creation, the AFM has expanded its operations rapidly, making it one of the most active and organised emerging markets in the Middle East[8].

2.6.1 Structure and Size of The Financial System

The Jordanian Banking System comprises licensed banks, special credit institutions, and long-term institutions, such as pension funds and insurance companies. Licensed banks are the central players in the system accounting for about 90 percent of total financial system assets. Specialised credit institutions have captured 4 percent of total financial system assets.

2.6.1.1 Licensed Banks

Commercial banking in Jordan goes back to 1925 when the Ottoman Bank[9] started its operation in the country. The Arab Bank, which was established in Jerusalem in 1929 and which moved headquarters to Amman after the 1948 war, was the first local bank. The Jordan National Bank followed the Arab Bank in 1956. In 1960, two new local banks were established: the Bank of Jordan and the Cairo-Amman Bank. It is useful to note here that in the early stages of its development and until the 1950s, the banking system in Jordan was dominated by foreign banks, mainly British (Hayek and Zreikat, 1976). Thereafter, more local and foreign banks were established, bringing the total number of licensed banks to twenty one by the end of 1998, of which nine were national commercial banks and five

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[7] For comparison see Beck, *et al.,* (1999a) and Demirguc-Kunt and Levine (1999).
[8] In the next chapter we will provide a detailed analysis of the development of the AFM.
[9] The name was changed to the Grindlays Bank in the late sixties.

were branches of foreign banks, in addition to two Islamic banks and five investment banks. These banks have a total of 457 operating branches. The demographic indicator of the total number of branches of operating banks is about ten thousand citizens per branch. This statistic indicates congestion in the Jordanian banking sector. In the US, by comparison, although there is only one bank branch for every thirteen thousand people, however, the enormous disparity in annual per capita income, which is thirteen times greater in the US than it is in Jordan, should be noted here. The numbers of Jordanian bank branches operating abroad, including representative offices, are 107.

Banks have to be licensed by the Central Bank of Jordan (CBJ) before they can operate in Jordan, they must also comply with CBJ regulations with respect to their activities and practices as well as the ratios fixed by the bank's credit, liquidity, cash reserves, and capital. Banks may not open new branches or merge with other established banks except with the approval of the CBJ.

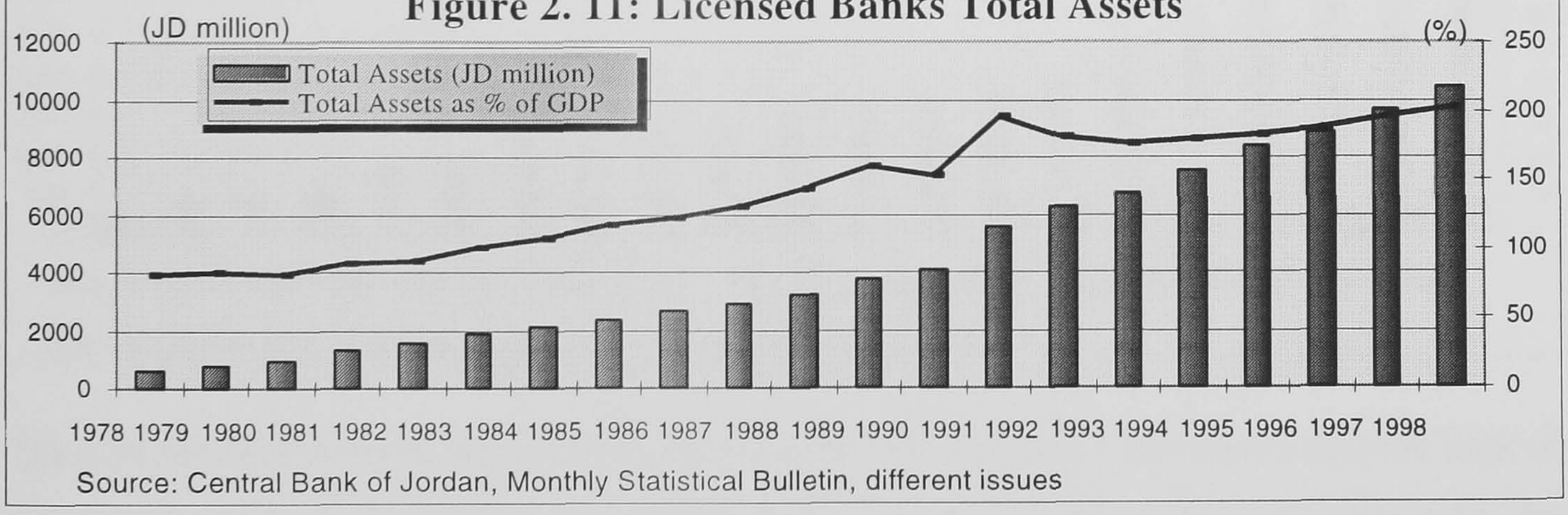
The licensed banks in Jordan are completely privately owned, and compete with each other for custom. The development of automation within the banking sector has been spasmodic since it began in the early 1980s. The allocation of commercial bank finance is a matter for the banks, not for the government. The Government provides investment finance in other ways, particularly through its own expenditure. Nevertheless, the major source of finance in the economy is the banks, together with specialized financial institutions and the AFM. Jordan's banking industry is highly concentrated and characterised by an oligopolistic market structure. The largest three banks in the market, Arab Bank, Housing Bank and Jordan Bank, had a market share of 91 percent at the end of 1996 (Demirguc-Kunt and Levine, 1999).

The recession in the mid-1980s caused deep problems in the Jordanian banking system. By the end of the decade, the share of uncollectable loans of the banks' portfolios was estimated at 30 percent. In these circumstances, several banks were technically bankrupt (World Bank 1994). In 1989, one of the major financial institutions, Petra Bank, failed, triggering what threatened to be a major banking crisis. The system stood vulnerable to further failures.

This situation has changed dramatically since 1991. As the Government's macroeconomic and adjustment programme succeeded in stabilising the economy, and as the monetary inflows of the workers returning from the Gulf states resulted in a higher demand for nontradable goods, the volume of economic activity recovered and the price of land and property went up sharply, bailing out the banking system's debtors and increasing the value of the collateral already foreclosed. Also, the spread of the banks widened substantially, increasing their profitability. These events increased the value of the banks' capital and allowed them to build reserves against losses.

Total banks assets have shown an impressive increase as is demonstrated in Figure 2.11. They increased to JD 10,460.2 million in 1998, compared with JD 637.1 million in 1978, or at an average annual growth rate of 14.2 percent. The growth in the total assets of licensed banks is attributed to the intensifying degree of financial intermediation. Total banking system assets as a percentage of GDP, which is normally used as a measurement of the importance of the banking sector in the economic development process, was 81.7 percent in 1978, and exhibited a continuous increase to reach 199.8 percent by the end of 1998. Although the ratio fluctuated during some periods, the general trend was in an upward direction. This ratio being more than 1.0 indicates that the banking sector is growing at a faster rate than GDP.

Figure 2. 11: Licensed Banks Total Assets

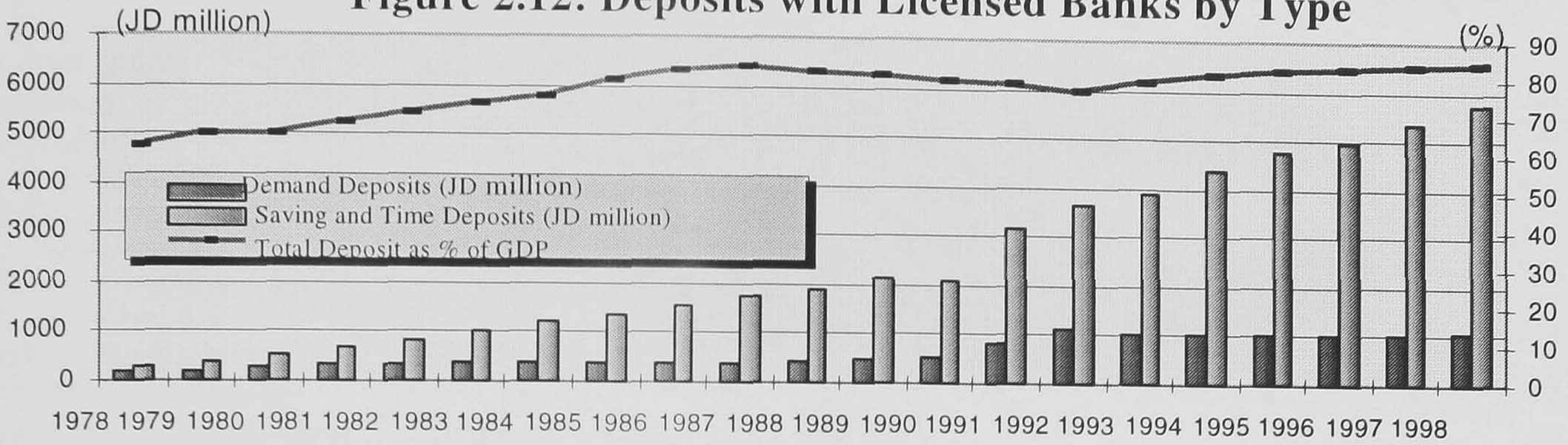


Source: Central Bank of Jordan, Monthly Statistical Bulletin, different issues

Total deposits held by licensed banks rose from JD 448.5 million at the end of 1978 to JD 6,811.4 million at the end of 1998, that is at an average annual rate of 13.8 percent. As a percentage of GDP, total deposits increased from 57.5 percent in 1978 to 130.1 percent in 1998 (see Figure 2.12). Licensed banks financed their activities mostly via time deposits, which at the end of 1998 commanded an average share of about 72.6 percent of total

banking system deposits, followed by demand deposits that accounted for about 15.7 percent of total banking system deposits.

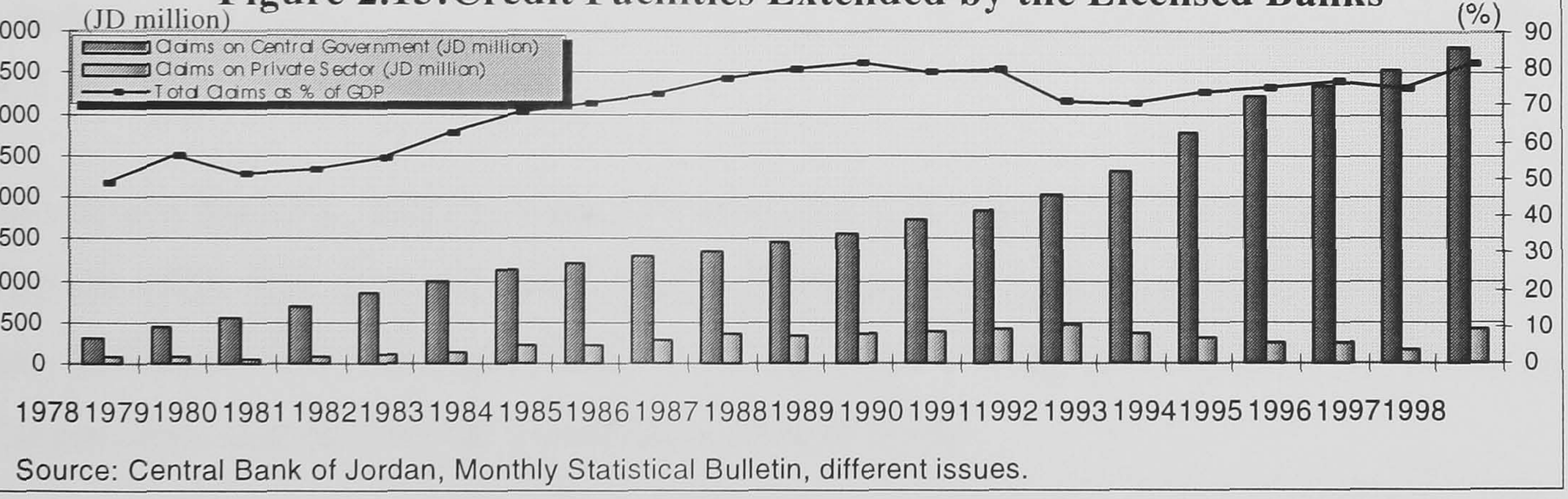
Figure 2.12: Deposits with Licensed Banks by Type



Source: Central Bank of Jordan, Monthly Statistical Bulletin, different issues.

Credit facilities by licensed banks increased from JD 332.8 million in 1978 to JD 4,285.3 million in 1998, registering an average annual growth rate of 13.0 percent. As a percentage of GDP, credit facilities increased from 42.6 percent in 1978 to 81.8 percent in 1998 (see Figure 2.13). Licensed banks' credit to the Government declined from 20.5 percent of total credit facilities in 1978 to less than 10 percent in 1998. It is important to note here that credit growth rose in line with the strengthening economy.

Figure 2.13:Credit Facilities Extended by the Licensed Banks

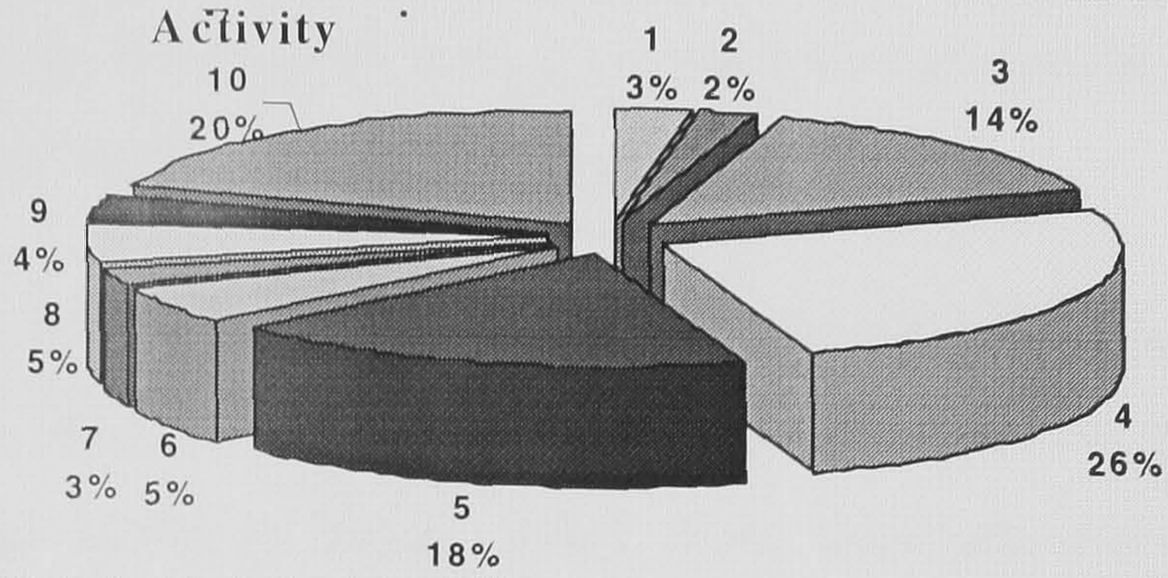


Source: Central Bank of Jordan, Monthly Statistical Bulletin, different issues.

Data on sectoral distribution of credit facilities in 1998 (Figure 2.14) shows that the bulk of licensed banks' credit facilities go to financial services, mainly trade. Consequently, the commodity producing sectors received proportionately less finance, with agriculture receiving about 3 percent and industry and mining a little over 16 percent. In the case of agriculture, this might be explained by the fact that a substantial part of agricultural activities is linked either to subsistence agriculture or to very small-scale farms, which generally do not have any access to credit facilities. Another possible explanation is that

Jordan has a special financial institution, the Agricultural Credit Corporation, which provides subsidised loans to this sector.

Figure 2.14: Credit Facilities Extended by the Licensed Banks According to Activity



Source: Central Bank of Jordan, Monthly Statistical Bulletin, June 2000.

2.6.1.2 Specialized Credit Institutions

Specialised credit institutions (SCI) were established to provide medium- and long-term credit facilities on concessional terms suitable for the financing of development projects in Jordan's different economic sectors, particularly agriculture, industry, and housing. These institutions complement the bank's role rather than provide a substitute for their finance. They were created in order to allocate resources and activities that the market supposedly left unattended. At present, there are five specialised credit institutions in Jordan, three of which are government-owned, while the public and private sectors jointly own the other two.

Specialised banking activities began with the establishment of the Economic Development Fund in 1951. The SCIs in Jordan are the following: the Agricultural Credit Corporation, the Industrial Development Bank, the Jordanian Credit Corporation, the Housing Corporation, and the Rural & Urban Development Bank.

The consolidated balance sheet of specialized credit institutions shows that total assets increased from JD 412.3 million in 1993 to JD 505.2 million in 1998, or at an average annual rate of 3.5 percent. According to the lending activity of SCIs, the outstanding balance of their loans increased from JD 287.9 million in 1993 to JD 343.1 million in 1998, or at an average annual rate of 3.0 percent (see CBJ, 1998).

2.6.1.3 Insurance Company and Pension Funds

The insurance industry in Jordan has developed rapidly during the last decades. New companies have been established, premiums have increased to a great extent, and awareness of the need for insurance has become explicit. At present, there are 26 insurance companies operating in Jordan, of which one is a foreign company.

However, in Jordan, as in many developing countries, the main line of insurance business is compulsory motor insurance, which is often subject to regulated and low premiums. Motor insurance produces large technical losses, which force insurance companies to scrutinise claims and delay their settlements. In many cases, large court awards complicate matters, as claimants prefer to go to court rather than accept reasonable settlements by insurance companies. A climate of mistrust has evolved over time between insurance companies and their clients. This has had adverse effects not only on motor insurance but also on the development of other personal lines, including household and life insurance.

The insurance sector in Jordan is a small but growing one. Total premiums were JD 57.7 million in 1998, representing 1.1 percent of GDP. By international standards, this is a small proportion, especially when compared with the insurance sectors in the United States (8.57 percent), and in Great Britain (11.43 percent). In large part this may be attributed to the underdevelopment of life insurance. In 1998, the life insurance represented around 22.2 percent of gross insurance premiums, while motor insurance represented around 58.5 percent in the same year. The existence of a credible social security system, together with cultural and religious factors may explain the underdevelopment of life insurance in Jordan.

With regard to pension funds, there are two major pension funds in Jordan for state employees (one for full-time, and the other for part-time employees). In addition, there are many other pension funds, established by professional associations and by large enterprises. These institutions should be concerned with maintaining funds and be primarily concerned with maintaining and increasing the value of savings of their contributors. However, many of them are used to granting subsidised housing loans to their participants, to organised societies, and to their employees. These subsidised loans detract from the funds' ability to fulfil the purpose for which they were established. Many of them are also forced to invest a substantial portion of their assets in short-term loans.

The largest of these institutions is the Social Security Corporation. This institution, unlike those in many developing countries, has enjoyed greater freedom from government interference, but investment has been constrained by the highly conservative policies of the corporation and by the shortage of attractive investment opportunities. Increasingly, the corporation has been forced to place a growing percentage of its new flows into bank deposits, which accounted for around 50 percent in 1998, while investment in corporate equities was less than 15 percent and in mortgage and government bonds accounted for 3.4 percent in the same year (see CBJ, 1998).

2.6.2 Monetary Policy, Interest Rates and Foreign Exchange Rate

Prior to the establishment of the CBJ in 1964, the Jordan Currency Board and the Ministry of Finance managed the currency and monetary affairs of Jordan. The former was responsible for issuing and redeeming local currency in exchange for sterling and investing the currency cover in British government bonds and treasury bills, while the latter was in charge of exchange control operations and the licensing of commercial banks.

With the changing economic and financial environment, a need was felt for creating an effective authority capable of managing monetary and credit policies most conducive to domestic economic development. The CBJ was established in accordance with Law No.4 of 1959. By the end of 1963, the members of the first Board of Directors of the CBJ were appointed by the Council of Ministers, and the Bank began its operations on October 1, 1964.

Since its establishment, the CBJ has confined its efforts to the realisation of its basic goals, notably to maintain monetary stability, to ensure investors' confidence in the Jordanian dinar, and to create a price environment that reinforces the stability of Jordanian economy. The objectives and functions of the CBJ are outlined in article 4 of the CBJ Law No.23 of 1971. This article states that " *The objectives of the Central Bank shall be maintain monetary stability in the Kingdom, to ensure the convertibility of Jordan Dinar, and to promote the sustained economic growth in the Kingdom in accordance with the general economic policy of the Government*".

As shown above, the present Law of 1971 has not confined the CBJ to practising traditional Central Bank activities, but it has also been empowered to play a development role consistent with the changing needs of the Jordanian economy. The CBJ's objectives of promoting sustained growth in Jordan keeps the door wide open for it to undertake measures and to pursue active monetary policies that are development-oriented.

2.6.2.1 Monetary Policy

In developed economies monetary policy is used as a means of steering the economy. The aim of monetary policy is to strike a balance between the need to avoid recession with the resultant unemployment problems while at the same time preventing overheating of the economy with its consequences for inflation. Monetary policy can also be used to compensate for fiscal policy laxness, as if there is excessive government spending which could be inflationary, a tight monetary stance would prevent this occurring.

In Jordan, monetary policy has been used as a tool of economic management since the CBJ was established. As mentioned above, the period during the 1970s and the early 1980s brought to the fore the capabilities of the Jordanian economy and its ability to react to economic advancements, which were enabling the economy to achieve high growth rates. This was partly due to the substantial increase in expatriate remittances, an increase in Arab oil exporting countries grants' and the rise in national exports. This contributed in increase of the Jordan's foreign currency reserves. During this period the goals of monetary policy were to reduce inflation, promote economic growth, mobilise domestic savings into productive investments and stabilise the Jordanian dinar. In order to promote economic growth and to combat inflation, the CBJ started a policy of limiting credit to consumer goods and increasing credit to productive projects.

As a result of these favourable developments and the monetary policy adopted, domestic liquidity (money supply M2) significantly increased from JD 606.7 million in 1978 to JD 1615.2 million at the end of 1984, or at an average annual rate of 16.4 percent. Development of domestic liquidity during this period indicates that the increase realised during this period involved two essential components: the first is a narrow money supply (M1), which includes currency in circulation with the public and demand deposits in Jordanian dinar, which registered an increase from JD 375.4 million in 1978 to JD 878.4 million at the end of 1984, or at an average rate of 15 percent per year.

The second component of domestic liquidity is the quasi-money, which consists of demand deposits in foreign currencies pertaining to the private sector, public entities, and financial institutions. This component registered a significant rise from JD 331.3 million in 1978 to JD 879.3 million in 1984, or at an average rate of 21.5 percent per annum.

During the period 1985-89, the Jordanian economy was hit by recession. The consequences of these effects were the contraction of the export market, the drop in expatriate remittances and Arab grant receipts. Under such circumstances, the Jordanian economy suffered serious setback from unfavourable developments that had a direct adverse impact on the major monetary indicators. M1 recorded average annual growth rates of 6.1 percent, while M2 registered average growth rates of 8 percent per year.

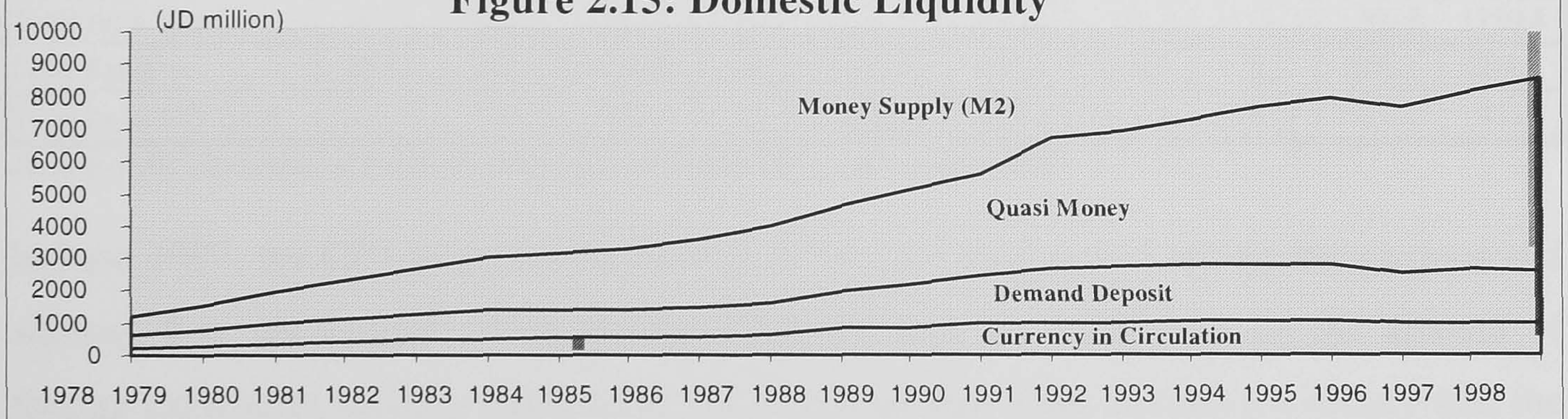
To counter the adverse effects and the sharp decline of late 1980s, the policies of the CBJ during 1990-98 were restrictive and designed to control inflation, reinforce the foreign reserve position to maintain the stability of the dinar's exchange rate in order to improve the performance of the economy, and to meet the objectives of the economic reform programme. More particularly, until September 1993, the CBJ pursued a direct monetary policy to influence the banks' liquidity and credit facilities granted by commercial banks. To improve the performance of the monetary policy and its impact on liquidity and bank credit, the CBJ started moving towards an indirect monetary policy. To implement its policy of indirect monetary control, the CBJ began to use certification of deposits as a tool of intervention in the money market to influence banks' liquidity and credit. The volume of intervention by the CBJ depends on the liquidity level maintained by the banking system, and expansion of credit is designed in accordance with the specified goals of the adjustment programme.

The CBJ began, on September 1, 1993, by issuing three and six months certificates of deposit in JD. To make it attractive for commercial banks to buy certificates of deposits, the CBJ frequently raised the rate of interest on these instruments. The rate was initially around 3 percent and recently reached about 8.5 percent. In January 1994, the rule limiting credit facilities to ten times a bank's net worth was abolished. In June that year, the reserve ratio on local currency deposits was reduced by 1 percent to 14 percent. As of 1 October 1994, interbank, headquarters and foreign branch deposits in Jordanian dinars were

excluded from the calculation of reserve requirements. The central bank described this as an attempt to promote the interbank market.

This monetary policy, succeeded in controlling the growth rate of domestic liquidity despite the accelerated growth of domestic credit during the earlier part of the 1990s. The new policy proved to be effective. The growth rate of domestic liquidity (M2) was maintained, reflecting positively on the monetary stability indicators of Jordan. M2 increased from JD 3122.6 million in 1990 to JD 6003.2 million at the end of 1998, or at an average annual rate of 7.5 percent. Money supply (M1), registered a slight increase from JD 1432.8 million in 1990 to JD 1625.2 million at the end of 1998, or at an annual average rate of 1.4 percent. Quasi-money registered a significant increase from JD 1,689.8 million in 1990 to JD 4,229.2 million in 1998, or at an average annual rate of 10.7 percent (see Figure 2.15). This increase is attributable largely to JD-denominated savings and time deposits, which reflect a higher degree of confidence in and the attractiveness of the Jordanian dinar to depositors.

Figure 2.15: Domestic Liquidity



Source: Central Bank of Jordan, Monthly Statistical Bulletin, different issues.

2.6.2.2 Foreign Currency Reserves

The CBJ keeps and manages Jordan's gold and foreign exchange reserves. Thus the Bank is responsible for the selection of suitable investments and the amounts to be invested in each currency, taking into consideration developments in foreign exchange and money and capital markets to ensure safety and profitability. The CBJ allows licensed banks to keep foreign assets in accordance with regulations it issues from time to time in conformity with the general economic interests of Jordan. From the beginning of 1992, the CBJ gradually dismantled foreign exchange controls in order to make international dealings easier for citizens, exporters, and importers as well as to encourage foreign investors.

One of the most prominent features of Jordanian economic performance in the last few years has been the significant achievements in the foreign currency reserves. The CBJ built up an unprecedented level of foreign currency reserves which amounted in 1997 to US$ 2,200 million, compared with US$ 459.7 million in 1989 (see Table 2.3). Foreign reserves thus became sufficient to cover Jordan's imports for a period of up to 7 months, compared with 2.3 months in 1989. With this cover, and with a growing comfort in the fundamentals of the economy, the CBJ began undertaking a substantial liberalisation policy. Reflecting the growing confidence in the economy and in the state of its own foreign currency reserves, the CBJ lifted restrictions on the Jordanian dinar and allowed it to be fully convertible.

Table 2.3: International Liquidity

(US$ Million)

Item	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Foreign Exchange	459.7	847.8	824.7	750.2	1631.9	1691.9	1971.7	1758.5	2200.1	1749.6
SDRs	11.0	1.0	1.1	0.6	5.5	0.7	1.2	0.8	0.2	0.8
IMF Reserve	0.0	0.0	0.0	16.4	0.0	0.0	0.0	0.0	0.0	0.00
Total Excl. Gold	470.7	848.8	825.8	767.2	1637.4	1692.6	1972.9	1759.0	2200.3	1750.4
Gold Reserve	103.2	101.3	104.6	102.2	100.6	198.6	195.9	179.7	200.7	204.3
Total including Gold	573.9	950.1	930.4	871.4	1738.0	1891.2	2168.4	1956.7	2401.0	1954.7

Source: IMF, International Financial Statistics, December 1991 and January 1999.

In June 1997, the CBJ removed the ceiling on forward buying and selling transactions and allowed free movements of capital by residents, with no restrictions on the amount of foreign currencies held by individuals. This was the first time in Jordan's history that the movement of currency had been completely free. The CBJ has also lifted all restrictions on the movement of investment capital. In 1998 Jordan witnessed a drop in foreign currency reserves to about US$ 1,750.4 million, largely due to King Hussein's illness.

2.6.2.3 Dinar's Exchange Rate Policy

Until the breakdown of the Sterling area on June 23, 1972, the Jordanian dinar (JD) was primarily linked to the pound Sterling. On February 22, 1975, the dinar was linked to the SDRs, a policy which lasted until 1986[10]. The dinar exhibited relative stability during 1975-85; it was supported by large capital inflows, mostly in foreign aid and the

[10] In response to the weakening of the US dollar in 1985 and to the resulting appreciation of the dinar, the link to SDRs was replaced by a basket of currency with the weight of the US$ higher than its weight in the SDRs.

remittances of the Jordanians working abroad. This exchange rate policy resulted in a real exchange rate appreciation of about 31 percent.

This value of the JD affected the competitiveness of Jordan by making Jordanian products more expensive than foreign products. This led to a reduction in exports and an increase in imports. As foreign goods were cheaper in JD, consumers could satisfy their wants by importing products rather than by producing domestic goods. In addition, these weakened the economic base and hindered the establishment of new productive investment, as the bulk of investments were concentrated in the real estate and mineral sectors. Furthermore, this led to an influx of foreign workers to work in Jordan, taking advantage of the foreign exchange differentials. Those workers accepted lower wages than did the Jordanian workers who priced themselves out of the market. This led to an increase in the unemployment rates in Jordan.

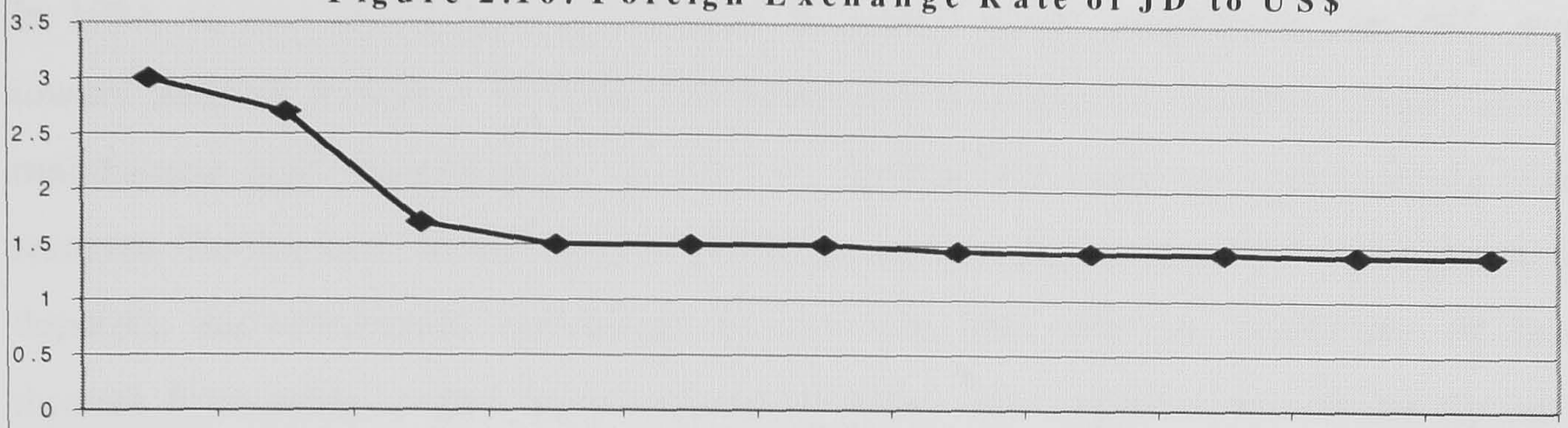
The ensuing recession during the second half of the 1980s and the balance of payment pressures forced the partial flotation of the dinar. In October 1988, the dinar was put on a managed float and devalued by about 12 percent. In February 1989, the authorities also devalued the dinar by about 13 percent (the exchange rate was fixed at US$1.76 per one dinar) and this devaluation was accompanied by the closure of the exchange houses.

The crisis, however, continued to deepen, with the spread between the official market and parallel market exchange rates rising rapidly. In an attempt to stabilise the market, the JD was delinked from the US$, on May 1989, and linked instead to a trade-weighted basket of currencies. In July 1989, a two-tie exchange rate was applied to the public sector's imports of essential goods and transferred to Jordanians studying abroad. The dual exchange system was terminated, and the exchange rates were unified at US$1.49 per dinar.

On October 1995, the CBJ amended a new policy for determining the Jordanian dinar exchange rate. Under this amendment priority was given to keeping the dinar's exchange rate stable against the US dollar and allowing it to fluctuate against other foreign currencies. The CBJ took this measure in order to impart greater transparency to the stable of the Jordanian dinar exchange rate, and to bolster the interest rate policy in its efforts to enhance the attractiveness of keeping assets denominated in Jordanian dinar against those denominated in US dollars. It is important to note here that, during the period (1992-98)

the main characteristic of the dinar was the stabilisation: it stood at an average of US$ 1.4 to JD 1 (see Figure 2.16).

Figure 2.16: Foreign Exchange Rate of JD to US$



Source: Central Bank of Jordan, Monthly Statistical Bulletin, different issues.

2.6.2.4 Interest Rate Policy

During the 1980s, Jordan's financial system operated under a fixed interest rate structure set by the CBJ, and passive in nature. Interest rates did not substantially change over time. The discount rate in Jordan moved from 5 percent in 1978 to 6.25 percent in 1993, and then finally to 9 percent in 1998. The CBJ did not appear to have used its discretionary power at that time to influence the banks' asset/deposit mix. Given the large amount of excess liquidity coupled with a low credit demand, changes in the discount rate did not have much influence on the behaviour of banks in Jordan.

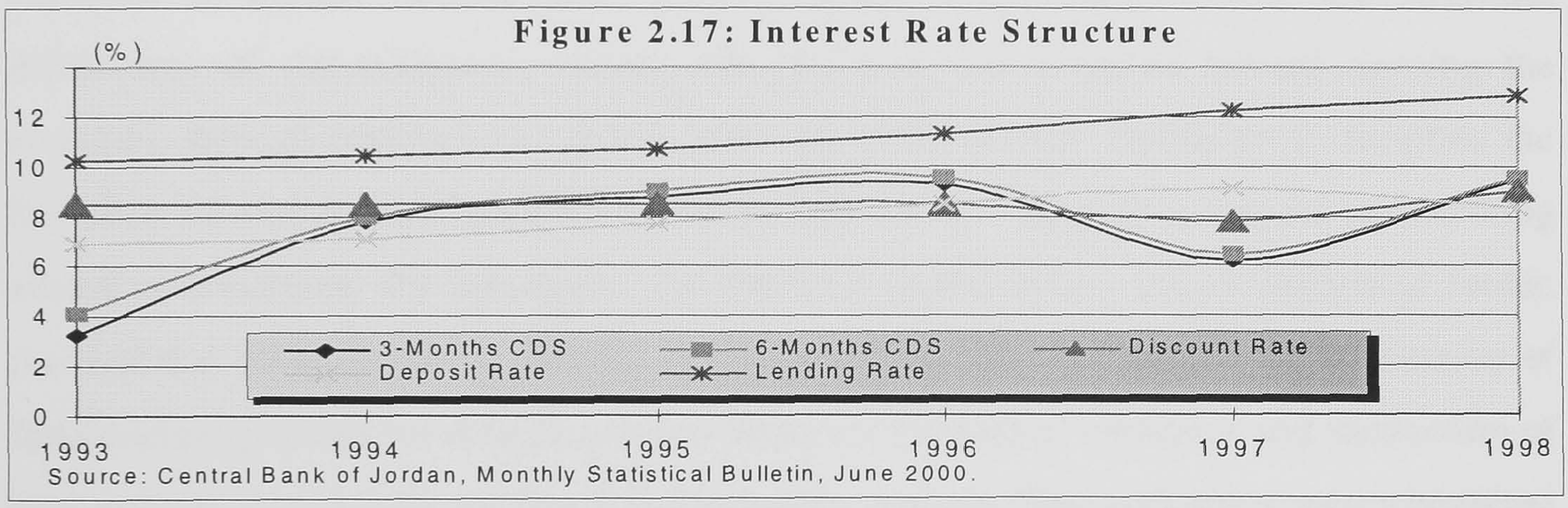
However, the policy of fixing interest rates suffered from a major problem. Those interest rates were set regardless of the rate of inflation prevailing in Jordan, and the most cases, interest rates were less than the prevailing inflation rates. This led investors to look for a quick profit by investing in unproductive projects. As a result, the policy limiting credit to combat inflation and stimulate economic growth led to a divergence of investment from long-term to short-term projects, *i.e.* trade, real estate and the housing sector. In September 1989, the CBJ took the first step towards liberalising the interest rate, by floating interest rates on deposits.

In February 1990, the CBJ floated the interest rate system on credit facilities, thus making the interest rates system fully liberalised. However, credit institutions specialising in promoting and financing priority productive activities were excluded from interest rate liberalisation. The aim was to ensure sufficient and relatively low cost financing for these priority sectors, such as agriculture, industry, rural development and housing. The rates of

interest charged on credit to these sectors remained at lower favourable rates, as specified by the CBJ.

In 1993, in line with Jordan's economic structural reform programme, the CBJ moved toward indirect measures of control. It undertook a restrictive monetary policy aimed at maintaining high interest rates in order to stabilise the currency and build up foreign reserves. To that end, the CBJ amended its interest rate policy in favour of long-term time deposits, and introduced one-month, three-month, and one-year certificates of deposit through bi-monthly tenders with commercial banks. The objective was to free up interest rates and allow them to be largely determined by market forces.

Figure 2.17: Interest Rate Structure



Source: Central Bank of Jordan, Monthly Statistical Bulletin, June 2000.

2.7 Summary and Conclusion

This chapter has given a comprehensive analysis of the macro environment of Jordan and analysis the reforms and the evolution of the financial sector development in Jordan. The Jordanian economy has experienced rapid expansion during the 1970s and the early part of the 1980s, as real GDP grew by more than 10 percent on average. However, this expansion was largely financed by foreign grants and remittances from Jordanians working abroad. In the second half of the 1980s, the pace of economic growth slowed and Jordan started to experience reversionary trends. These recessionary trends were transmitted from neighbouring oil producing countries to Jordan. Since these countries served as a market for Jordanian products and services, the slowdown in these countries affected the Jordanian economy.

As a result of this slowdown, Arab grants started to decline and the number of Jordanian workers working in these countries decreased as the Gulf countries terminated some of

their contracts. Moreover, the Gulf crisis in 1990/91 increased the imbalance in Jordan's economy. This crisis has impact on the economy through Jordan's economic regional linkages; trade, foreign assistance, and workers' remittances. The crisis touched the lives of all Jordanians and severely hit the fledgling Jordanian economy.

Following the near-collapse of its economy, Jordan was forced to re-examine its policies and to redirect its development strategies. The country was struggling with economic and financial crisis and traditional remedies were proving ineffective. Jordan stood at a critical crossroad. In response, the country chose to accelerate the liberalisation of its economy, and actively worked at enhancing its competitiveness within the regional and global contexts. In pursuit of this goal, Jordan removed, to a large extent, the structural imbalances of the economy. Remarkable progress was achieved toward opening the economy through regional and global free trade, harmonising legislation to facilitate the free flow of capital, stabilising the monetary indicators to reassure investors, and creating attractive conditions for investment and business opportunities. Policy makers in Jordan realised that wide-ranging economic structural reform policies implied the application of fundamental policies for an efficient reallocation of financial resources and redirection of new savings and investment flows to productive projects. The authorities also recognised that the reform of financial sector, including increasing access to foreign financial resources, would help to ensure sound and economically viable enterprises that would have access to the credit flows that were necessary for restructuring.

The Government has enacted a new Investment Law, amended the Income Tax Law and the General Sales Tax Law to make them more receptive to the private sector initiatives. Furthermore, it has removed cumbersome import licensing requirements, lowered and restructured the tariff regime, reduce income taxes and streamlined tax procedures.

In order to improve the functioning and standards of Jordan's financial sector, the Government has initiated a restructuring effort to promote Jordan as a regional financial hub providing modern financial services to the business community. Substantial progress has been made in adopting international norms relating to capital adequacy and prudential lending. The CBJ has made significant improvements in the supervision system by instituting full financial disclosure by the banks. It has already adopted a number of measures to replace direct control with indirect monetary instruments in order to

encourage competition among banks, and, as a confidence-building measure, removed the credit-to-deposit ratio, thus encouraging the evolution of an efficient interbank money market.

The structural and legislative adjustments were, for the most part, successful. The economy grew in real terms by an average of 4.7 percent during the period 1990-98. Inflation was checked to around 3.0 percent and the exchange rate of the Jordanian dinar remained stable. However, the Jordanian economy took a sharp downward turn toward the end of the 1990s. Domestic factors were in part responsible, but political and economic disruption in the neighbouring Palestinian and Iraqi markets contributed significantly. Nevertheless the World Bank described Jordan's economic reform and development agenda to be sound and well. In addition, in September 1996, Standard & Poor's upgraded Jordan from B+ to BB- in recognition of continued progress with fiscal prudence and structural reform. Jordan's upgrading was based on its progress in strengthening public finance, underpinned by a strong commitment to fiscal restraint. In addition, the outlook was revised to "*stable*" as a result of reduced vulnerabilities to adverse external economic and political developments.

However, more than any other country in the region, Jordan's future performance depends on political stability in the Middle East. Its three major sources of revenue- tourism, remittances and regional trade- are vulnerable to political setbacks. Progress in the peace process and the relaxation of the UN embargo on Iraq will inspire confidence in the Jordanian market. The Government also needs to continue with its policies of economic restructuring, privatisation and liberalisation, and put in place key legislation governing investment and taxation in order to stimulate the local and foreign investment needed to replace aid as the main support of the economy.

Chapter III

An Overview of the Development of the Amman Financial Market

3.1 Introduction

The increased attention given to emerging markets shown by the World Bank in promoting the establishment of stock markets in developing countries is part of a wider process focusing on the importance of the financial sector in leading development. In this context, the AFM was established in 1976. Since its establishment, the AFM has developed and expanded greatly. It has lately been the focus of attention of several international as well as national institutions because of its potential and its performance. This, coupled with political developments in the region, namely the peace process, has created more interest in investment opportunities in Jordan.

This chapter sheds some light on the establishment and objectives, the structure and characteristics of the AFM, its development and performance as well as its operational procedures. This chapter also highlights the development of the AFM in comparison with other emerging markets as well as with developed markets. Thus, with chapter II, this chapter provide the background for the empirical chapters which investigate the interaction between the stock market development and economic growth in Jordan.

3.2 Establishment and Objectives

The establishment of the AFM as the country's stock exchange was a major contribution towards improving the financial sector in Jordan, in order to enable it to realise a better utilisation of financial resources by mobilising local and foreign savings, and channelling such resources towards productive projects. Credit for establishing the AFM goes to the efforts

made by the CBJ and to the support and encouragement of the Jordanian Government in addition to the technical assistance offered by the International Financial Corporation (IFC) of the World Bank. Before the establishment of the AFM, the sale and purchase of stocks used to take place through a few real estate agents and brokers alongside their other activities. Moreover, there were no announced prices for stocks which resulted in high transaction costs as well as large price fluctuations.

The AFM is a public financial institution with legal, administrative, and financial independence. It was established in 1976 as the country's stock exchange, and started its first day of business on January 1,1978 with the 57 list companies. Following significant local and regional interest, the AFM became one of the most sophisticated stock markets in the Middle East and one of the most active stock markets among the emerging markets[1] (World Bank, 1994; Toukan, 1994; Cobham, 1995; El-Erian and Kumar, 1995; IMF, 1995; Vittas, 1997; ESCWA, 1997; Azzam, 1997; Demirguc-Kunt and Huizinga, 2000; and others).

The establishment of the AFM was a major step on the path of developing financial resources through the development of a sound capital market. According to AFM law, the objectives of the market are threefold: First, to mobilise savings by encouraging investments in securities thereby, channelling savings to serve the interests of the national economy. Second, to regulate and control the issuance of securities and dealings. This is to ensure soundness, ease, and speed of transactions in accordance with the financial interests of the country. Finally, to collect and publish information that will help investors evaluates all the quoted companies.

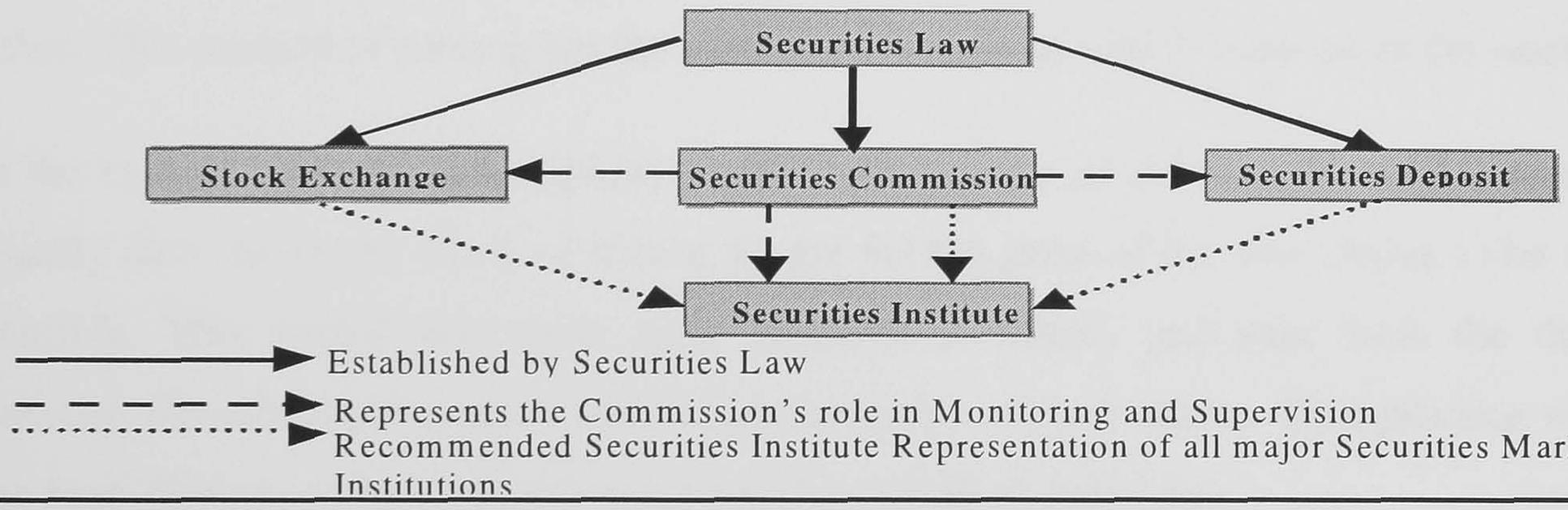
The AFM was also established to the process of raising and allocating capital that is so important in strengthening the Jordanian Economy. It can encourage savings and investment and offers investors the opportunity to participate in developing the private sector in Jordan and to share in the growth of its finest companies. By encouraging capital raising among corporations and investment abroad by participants, the AFM can contribute to accelerating Jordan's economic growth[2].

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[1] Emerging stock markets are defined by the International Financial Corporation to consist of stock markets in developing countries (low and middle-income economies).
[2] The main purpose of this study is to examine this issue.

Prior to the reform of the financial sector, the AFM operated under the auspices of the Ministry of Finance. Revenue and expenditures were treated as entries in the accounts of the general government budget, and were therefore collected and allocated by the Budget Department. In June 1997, a new Securities Law was enacted. Under this law, the AFM is regulated and supervised by the Securities Commission (JSC). The commission is responsible for establishing an enabling environment to achieve sound dealing in the securities and capital market of Jordan, and to protect securities holders, investors and the public from fraud and deceit. The commission regulates and monitors the business operations of the entities that fall under its supervision which are the securities exchange, the securities deposit centre, the financial services companies, the shareholding companies, the investment companies and mutual funds and the certified financial professionals (see Figure 3.1).

Figure 3.1: Market Institutions Created by the Securities Law



3.3 The Market Structure

The AFM combines features normally found in both a stock exchange and a government securities and exchange commission. It is a government-mandated vehicle for both the regulation and institutionalisation of the securities market in Jordan. The AFM has been given an appropriate mandate to promote the development of the securities market, and to regulate the activities of the number of firms dealing in securities, such as underwriters, brokers, and investment advisors, and to regulate the trading market as such. To this extent, the AFM functions not only as a typical stock exchange, but also as an organising and controlling body.

Like any other market, the AFM is composed of two main markets, which complement each other: the Primary Market and the Secondary Market. The main characteristics of each market, its components and its development are described below.

3.3.1 The Primary Market

The Primary Market deals with new issues. New issues consist of "*share issues*" and "*bond issues*". Share issues include issues by newly established companies, as well as by the established ones through capital increases or by public and private offering. Currently, the issuing price per share for newly established companies is set by law at JD 1. Before 1997, an issuing Committee at the Ministry of Industry and Trade in co-operation with the AFM determined a price for new share offerings by established companies. There was, however, no specific formula for calculating the price of new issues. The calculation was usually done based on a purely subjective weighting between the book value of the share and its market value. This method of pricing has the potential to create several distortions in the market.

In the case of a private subscription it was in the interest of the directors of a company, who usually own the larger block of shares, to ask for the price of the new shares to be as low as possible. This would save them large amounts of money and gain them the differential between the subscription price and the market price of their shares. This practice was not in the best interests of the company and could hurt small shareholders.

Currently, under the new Security Law, the General Assembly and the Board of Directors determine the prices of new issues using a market-based method. A market-based method of pricing more accurately reflects the value of the securities being floated. Pricing of new issues in more developed stock markets typically takes place through negotiation between an investment bank, an underwriter, and the company selling the shares based on its potential earnings. In a successful underwriting, shares would initially trade at a price close to the offering price, giving the seller evidence that he has the purchase price. The primary benefits of a market-based pricing of new issues would be to encourage companies to list shares on the exchange and to enable them to raise more money through the public issue of the same

number of shares. In addition, the success of the Government's privatisation efforts would be greatly enhanced under a transparent, market-based system of pricing.

This poses the puzzle of why companies can raise more equity now than before. An appealing explanation is that with equity issues so underpriced in the past, firms were reluctant to sell shares. Underpricing caused a huge excess demand for shares, with the chances of actually getting shares in a company very small. Further, there was typically a big jump in price on the first day of trading, conferring a capital gain on those lucky enough to acquire shares in the initial location. Subsequent share purchases did not benefit from this initial jump in share price, and counted more on long-term capital gains. This situation may have improved with liberalisation and with better opportunities for dynamic companies. Also, under the new pricing system the extent of over-subscription has gone down, improving chances of securing shares in the initial allocation and raising the expected return. In short, as the equity market moves into supply-demand equilibrium, the amount of equity can be expected to go up[3].

Since the establishment of the AFM, the number of primary issues in the market has increased tremendously with regard to equities. This indicates the growing potential and importance of the capital market in Jordan[4]. The AFM has witnessed six distinct phases in the growth of primary issues of shares. The first phase lasted from 1978 to 1982, when the value of primary issues increased from JD11.9 million to JD 91.3 million, or on average by around 69.6 percent per year. The second phase lasted for the following 10 years during which the value of primary market issues declined at an annual rate of 5.1 percent to reach JD 54.6 million in 1992. This mainly due to the slowdown of the economy during this period[5]. The third phase witnessed a phenomenal increase, with the value of primary issues increasing by 318.3 percent in 1993 to JD 228.394 million, and by a further 102.9 percent in 1994 to reach JD 463.3 million. This indicates that companies were increasingly turning to the stock market as a means of raising funds. This was due partly to a significant increase in market prices, and the

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[3] But of course, for the investor, whose opportunity cost is the interest rate, capital gains do matter and the sum of dividend yield (measured relative to market price) and capital gains must exceed the interest rate sufficiently to compensate for the higher risk.

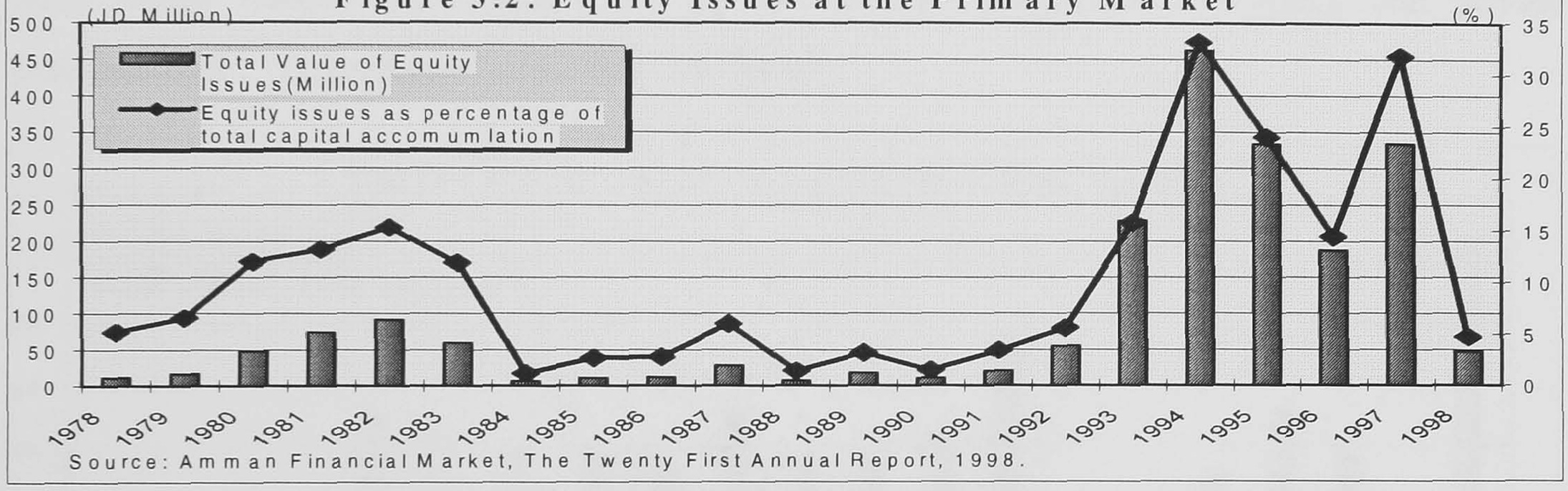
[4] Aylward and Glen (1999) rank Jordan one of the top three countries among the emerging economies according to the importance of equity issues in financing investments.

[5] See Chapter II.

credit tightening imposed by the CBJ has also encouraged this move by making the more traditional bank loan less available.

The fourth phase saw declines of 28.8 percent in 1995 and 43.1 percent in 1996, with primary issues reaching to JD 187.7 million. The fifth phase witnessed another dramatic increase, with the value of new primary issuing reaching JD 337.7 million in 1997, or an increase of 77.8 percent above their 1996 level. Finally, as a result of a significant decline in market prices in 1998, the primary issues declined sharply to JD 47.5 million (see Figure 3.2).

Figure 3.2: Equity Issues at the Primary Market



Source: Amman Financial Market, The Twenty First Annual Report, 1998.

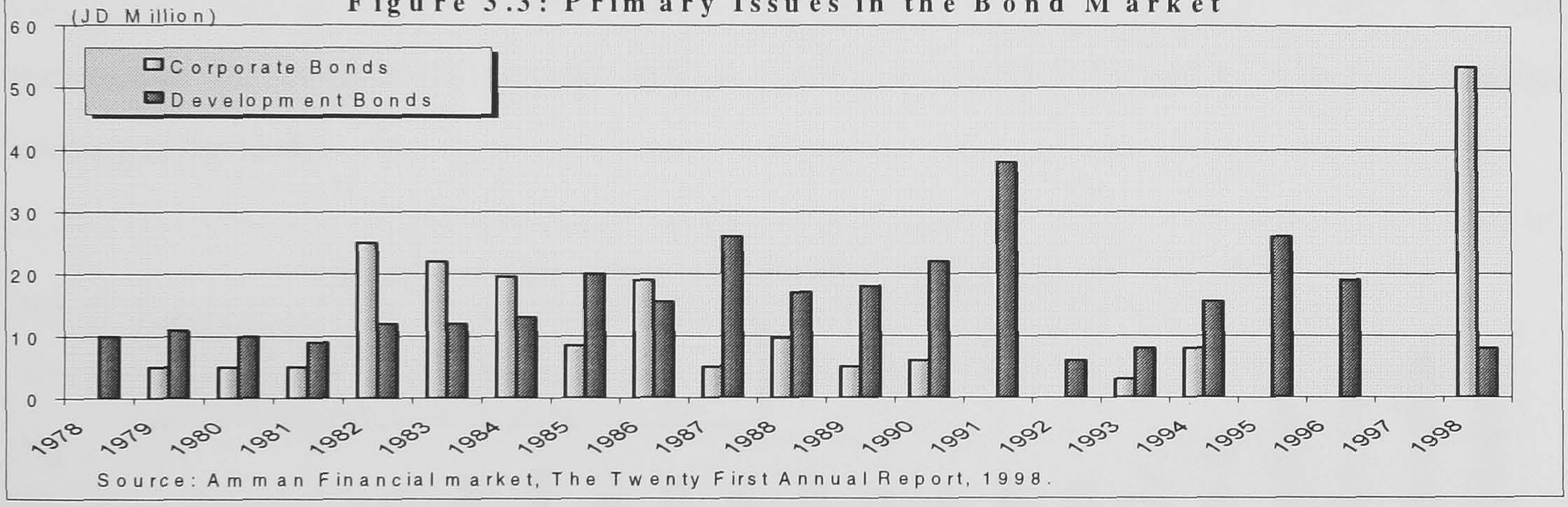
It is worth mentioning that the value of new issues during the period 1993-98 is double the combined sum of the value of new issues during the period 1978-92. This tremendous increase in the activity of the primary market can be attributed to many factors, among which are the potential of the Jordanian economy in the light of the peace treaty, the increase in trading volume in the secondary market, and the increase in stock prices that encouraged many established companies to raise their capital through issuing new shares to the public.

The AFM plays a central role in facilitating business expansion in Jordan and efficiently channelling resources to serve the interests of the overall economy. In most recent years, since the AFM come into existence, business and the general public have become increasingly aware of the benefits such a market offers. Businesses have turned to the stock market as a means of financing expansion and of raising funds. Capital formulation in Jordan has increased from around JD 229.1 million in 1978 to over one billion in 1998. At the same time, new issues have increased over tenfold during the same period. The ratio of total value of new

shares to gross fixed capital formulation has increased from around 5.2 percent in 1978, to over 25.3 percent in 1997 (see Figure 3.2). This reflects not only the market's maturity, but also public confidence in it.

The Jordan bond market is much less developed and still in the early stages of development. It has always been weak and dependent mainly on government development bond issues. New issues of corporate bonds registered a small value, almost zero during most years in the period 1991-98 (see Figure 3.3). Currently, most bonds are issued by the CBJ for monetary purposes in small quantities and denominated in the local currency. In 1998, it issued JD19 million of these bonds (called Development Bonds) which were purchased by official and private pension funds, commercial banks, and individuals.

Figure 3.3: Primary Issues in the Bond Market



Source: Amman Financial market, The Twenty First Annual Report, 1998.

3.3.2 The Secondary Market

The Secondary Market is the market that trades in securities which have already been issued and subscribed. It is divided into four markets: The Parallel Market, Regular Market, Bond Market, and Legal Transfers (transactions off the trading floor). Trading in the Secondary Market is conducted five days a week, Saturday to Wednesday. The first step a company takes upon fulfilling the legal requirement for registration is to apply to the AFM for listing. If approved, it adopts the status of "*waiting to be listed*".

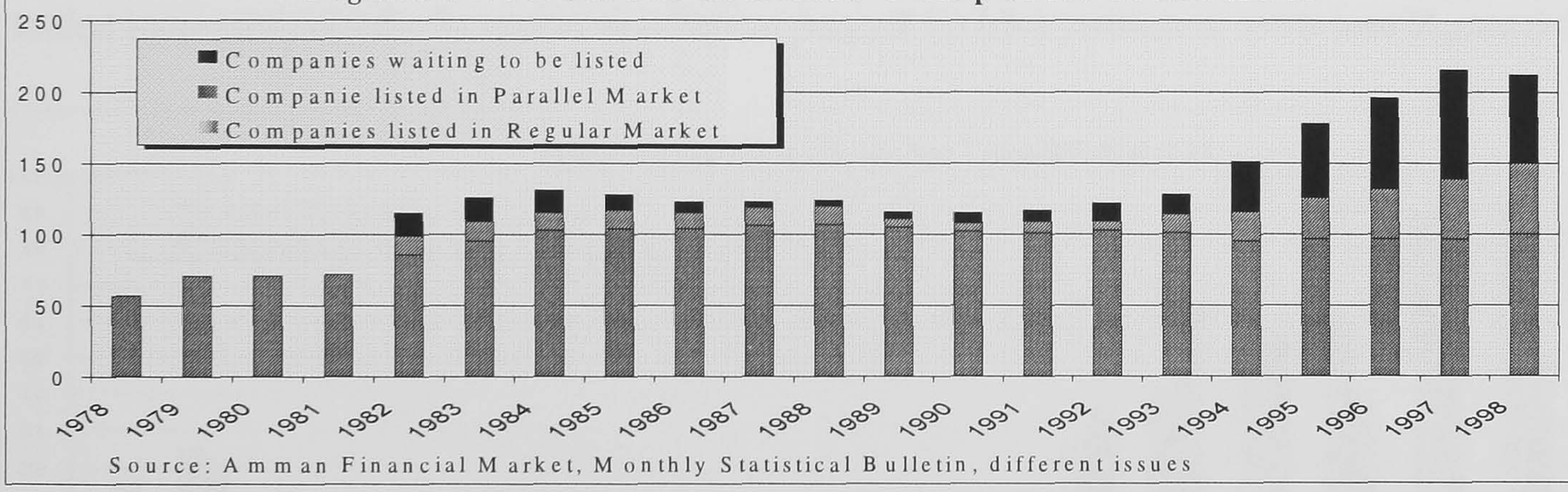
Companies waiting to be listed are prospective entrants to the Parallel Market, and are not traded on the trading floor. These companies are traded through the Legal Department at the AFM. This group includes those companies whose listing requirements have not yet been met,

and in addition, listed companies which have violated certain listing requirements and have been degraded by the AFM. The Parallel Market, in turn, includes those companies waiting to be listed in the Regular Market.

However, before becoming eligible for listing in the mainstream transactions of the Regular Market, the company must have been in operation for two years and must have published two annual financial reports. The company's stocks are traded in the Parallel Market for at least one year, and it has at least ten percent of its shares traded before the AFM Securities Commission considers it for regular listing.

Since the AFM was established, the number of listed companies has almost doubled. And also, as shown in Figure (3.4), most companies are traded in the Regular Market. In 1978, only 57 companies were listed in the AFM, all of them being traded in the Regular Market. In 1998, there were 100 listed in the Regular Market and 50 in the Parallel Market, with 62 companies waiting to be listed.

Figure 3.4: Number of Listed Companies at the AFM



Source: Amman Financial Market, Monthly Statistical Bulletin, different issues

3.3.2.1 The Parallel Market

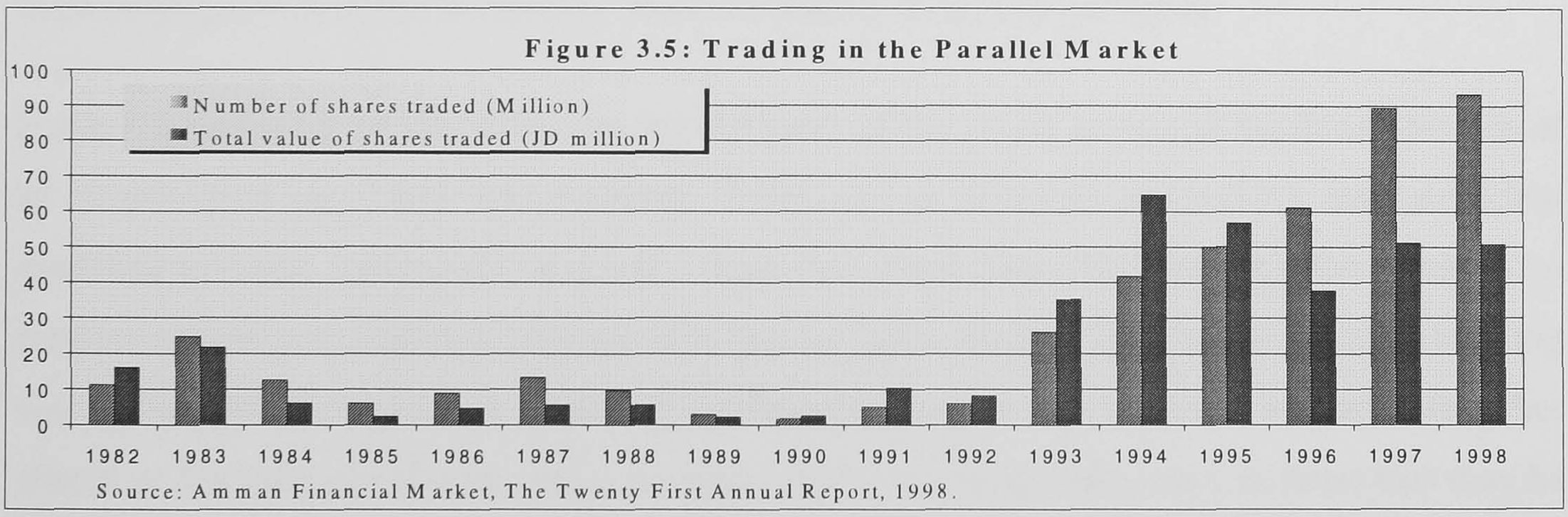
The Parallel Market offers newly emerging companies, which need liquidity, an opportunity to have their shares traded in an orderly and fair manner while preparing to meet the more rigid requirements of formal listing in the Regular Market. Since new companies must meet special requirements set by the AFM Securities Commission before being transferred to the Regular Market, the establishment of this market was necessary for trading shares prior to formal listing. To this extent, the Parallel Market is a preparatory market for listing in the Regular

Market. The trading rules of the Parallel Market are similar to those of the Regular Market. Listing requirements are less stringent, but offer the same essential protection to the investor.

In addition, the Parallel Market was established due to the tremendous increase in the demand for shares in the early 1980s. This was represented by an accelerated increase in the volume of trading and in the number of shares traded in the Regular Market causing, an imbalance between the demand and supply of shares which prevailed at the time.

The Parallel Market was established in 1982 and began its first day of trading on February 20th of that year. Since its inception, the Parallel Market at the AFM has experienced distinct phases of growth in terms of share trade and volume and it has developed into a fully-fledged market, meeting the demands of companies and investors alike. The total number of shares traded increased from JD 11.2 million in 1982 to JD 24.8 million in 1983 before declining to JD 12.6 million in 1984 and to JD 6 million in 1985. It then increased in the following two years to reach JD 13.4 million in 1987, before declining sharply to a trough value of JD 1.7 million in 1990. After declining during the Gulf crisis year 1990/91, the number of shares traded increased rapidly thereafter reaching a peak of JD 93.2 million in 1998 (see Figure 3.5).

Figure 3.5: Trading in the Parallel Market



Source: Amman Financial Market, The Twenty First Annual Report, 1998.

As can be expected, the increase in total number of shares traded has been accompanied by increases in volume. In 1982 the value of traded shares was approximately JD16.4 million, it increased to JD 21.8 million in 1983 or by 32.9 percent, before declining to JD 6.2 million in 1984 and JD 2.4 million in 1985. Over the two years, the value of trade in this market recovered to reach JD 4.7 million in 1986 and JD5.6 million in 1987. However, as a result of the 1988 economic crisis, the volume of share trade sharply declined to reach JD 2.5 million in

1990 at an average annual rate of 24.4 percent. Over the following seven years, the volume of share trade in Parallel Market increased at an average annual rate of 25.3 percent to reach JD 50.8 million in 1998 (see Figure 3.5).

3.3.2.2 The Bonds Market

Bonds traded at the AFM include corporate bonds, development bonds, treasury bonds, and treasury bills. The maturity of these debt instruments ranges between 3 months to 10 years. Trading in bonds and bills at the AFM has been generally slow. Since the AFM came into existence, the volume of bonds traded has fluctuated between JD 2 million and JD 22.2 million. During the period 1978-98, the volume of equity traded incorporated an average of 97.9 percent of overall volume in the Secondary Market. Bonds, on the other hand, registered the rest (see Table 3.1).

There are several factors underlying the underdevelopment of bonds market in Jordan, among them the sudden burst of inflation of the late 1980s, which caused large losses to the holders of fixed-rate bonds. Also, there are few bonds issued, with most being held until they mature. In most cases, bonds are sold to banks at subsidised rates and this in effect discourages banks from selling bonds in the Secondary Market because of the loss involved.

Further, a major factor inhibiting the development of the bonds market in Jordan is the lack of an institutional and legal infrastructure. There are no financial institutions with sufficient expertise to price, underwrite, and sell a corporate bond issue. The bond market needs to be supported by an institutional infrastructure that includes, among other things, efficient clearing and settlement arrangements. Clearing, settlement, custody and payment systems are either absent or not fully developed, and, as a result, trades run many risks, such as those that may be created by the unreliability of counterparts, fraud, and multiple trades of the same securities. Jordan needs creative financial institutions that can meet the changing financial requirements of the country, be it projects finance, flouting rates or any other form of fixed rate financing. Investment bank services are also needed, these include strong financial analysis, underwriting of bond issues, floating of these bonds to the public at large and making market of these

issues. Other factors, such as the lack of information and market makers with access to liquidity support, also hamper bonds market development in Jordan.

Table 3.1: Trading Volume in the Secondary Market

Year	Organized Market		Parallel Market		Transaction off the Trading Floor		Bonds Market		Total Vol. in Secondary Market
	Trading Volume (JD M)	% To Total Vol. In Seco. Market	Trading Volume (JD M)	% To Total Vol. In Seco. Market	Trading Volume (JD M)	% To Total Vol. In Seco. Market	Trading Volume (JD M)	% To Total Vol. In Seco. Market	(JD M)
1978	5.6	57.7	0.0	0.0	4.1	42.3	0.0	0.0	9.7
1979	15.8	77.5	0.0	0.0	3.8	16.6	0.8	3.9	20.4
1980	41.3	83.1	0.0	0.0	6.7	13.5	1.7	3.4	49.7
1981	75.4	89.4	0.0	0.0	6.6	7.8	2.3	2.8	84.3
1982	112.2	80.5	16.0	11.5	9.6	6.9	1.9	1.1	139.7
1983	119.5	76.3	22.8	14.6	13.4	8.6	0.6	0.5	156.3
1984	53.0	76.8	6.2	9.0	8.3	12.0	1.7	2.2	69.1
1985	64.4	72.3	2.4	2.8	14.4	16.9	3.6	4.2	84.8
1986	65.8	65.6	4.8	4.8	26.1	26.4	2.5	3.2	99.2
1987	142.6	85.5	5.6	3.4	18.0	10.8	1.0	0.6	166.0
1988	127.0	74.3	5.7	3.3	22.2	13.0	16.7	9.8	171.6
1989	365.2	66.0	2.3	0.4	164.9	29.8	22.2	3.8	553.3
1990	226.4	90.7	2.5	0.0	17.8	7.1	3.1	2.2	249.4
1991	292.4	91.2	10.4	3.2	16.0	5.0	1.5	0.6	319.9
1992	878.7	97.0	8.2	0.9	15.3	1.7	4.3	0.4	905.8
1993	933.4	92.4	35.2	3.5	37.4	3.7	4.6	0.4	1010.0
1994	430.3	78.8	64.7	11.8	47.4	8.6	4.3	0.8	546.7
1995	362.1	70.4	56.8	11.1	83.0	16.1	12.2	2.4	514.1
1996	210.7	74.5	37.9	13.4	28.9	9.9	5.1	2.2	282.6
1997	304.1	71.7	51.2	12.0	67.7	16.0	2.0	0.3	424.9
1998	413.6	76.8	50.8	9.4	69.7	12.9	4.1	0.9	538.2

Source: Amman Financial Market, The Twenty First Annual Report, 1998.

3.3.2.3 Transactions off the Trading Floor

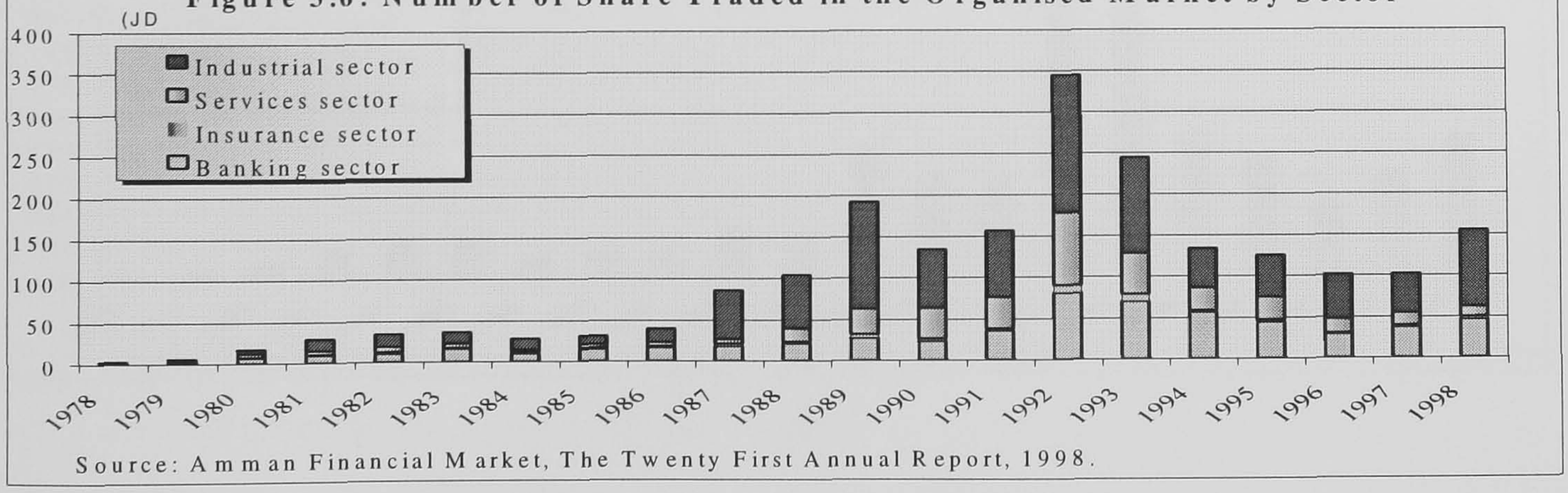
The Secondary Market also serves the purpose of legal transfers. The Legal Department at the AFM provides a setting for special transactions such as sales of unlisted companies, transactions from abroad or those which involve transfers within families and are related to inheritance. In 1998, transactions off the trading floor registered JD 70.2 million, representing almost 13 percent of the overall volume of trade in the Secondary Market (see Table 3.1).

3.3.2.4 The Regular (Organised) Market

The Regular or Organised Market is that part of the Secondary Market that regulates and supervises at the trading floor of the AFM controlled by certain listing requirements. Most companies listed at the AFM are traded on the regular market. Companies listed in this market are divided into four sectors; the banking and financial institutions sector; the insurance sector; the services sector; and the industrial sector. In 1998, there were 100 companies listed in the market, compared to 57 companies in 1978. The industrial sector accounted for 48, services 19, insurance 17, and banks and financial institutions 16. The majority of transactions in equity dealing at the AFM take place at the Regular Market, during 1978-98, since the AFM was set up, the volume of equity traded in this market represented an average 78.5 percent of overall volume traded in the Secondary Market.

The industrial sector is generally the most active in terms of traded shares, it accounted for 46.7 percent of overall volume traded in this market in 1998, followed by the banking sector at 46.2 percent, the services sector which accounted for 15.8 percent, and finally the insurance sector at 1.3 percent. During the period 1978-92 witnessed a dramatic growth in the number of shares traded at the Regular Market. The total number of shares traded in this market increased from 2.4 million in 1978 to a peak value of 344.8 million in 1992, before declining to JD 244.3 million in 1993 and to JD 154.6 million in 1998 (see Figure 3.6). It is worth noting here that the ratio of the total number of traded shares to the total number of subscribed shares increased gradually from 2.8 percent in 1978 to reach 87.1 percent in 1992 before declining to 57.3 percent in 1998.

Figure 3.6: Number of Share Traded in the Organised Market by Sector

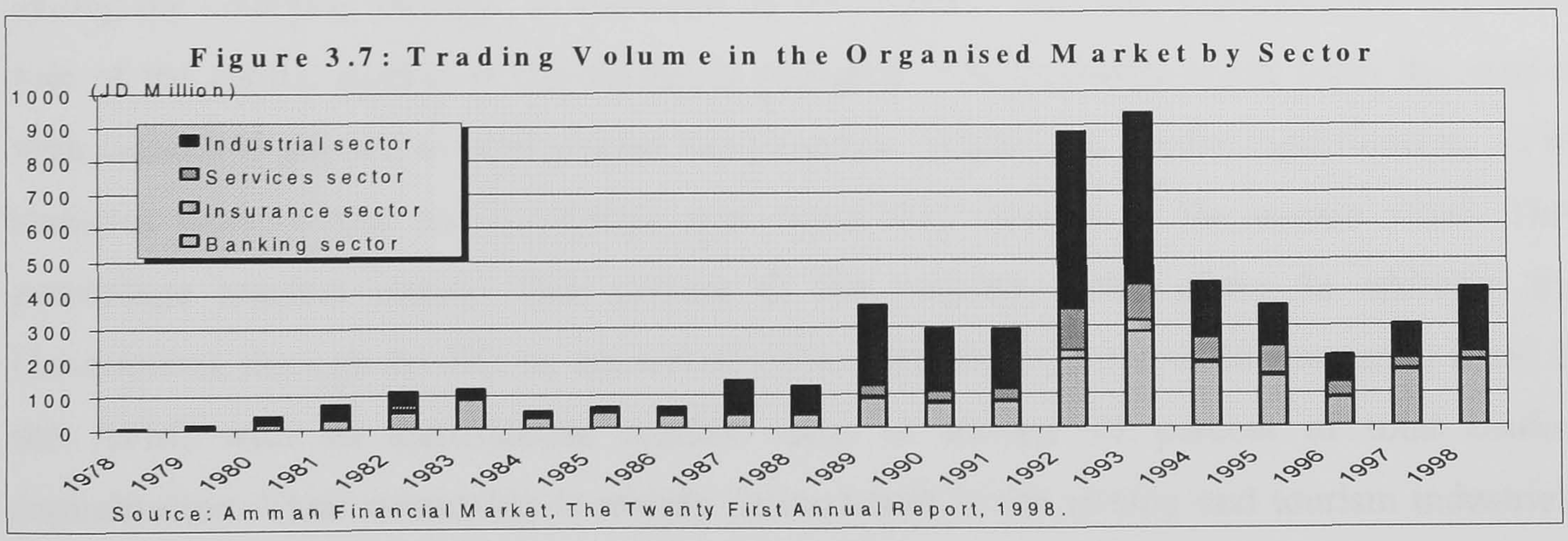


Source: Amman Financial Market, The Twenty First Annual Report, 1998.

As can be expected, the increase in the total number of shares traded has been accompanied by an increase in trading volume and market capitalisation. In 1978, the value of traded shares was approximately JD 5.6 million; it increased on average by 45.0 percent per year during the nine-year period up to 1987 to reach JD 142.6 million. However, due to the economic crisis and the instability of the JD exchange rate in 1988, the volume of shares traded dropped by 11.6 percent to JD 127 million. After the crisis was absorbed, an increase in volume occurred until the onset of the Gulf crisis when the volume decreased to JD 268.9 million in 1990 compared to JD 367.6 in 1989; the value of shares traded increased rapidly thereafter, reaching a peak in the market's life of JD 933.4 million in 1993. The main reason for the huge volume increase during 1992 and 1993 could be explained by the extraordinary situation which followed the Gulf crisis in terms of extra liquidity in the economy, lack of investment opportunities, and a limited supply of shares. These factors also subsequently affected the prices of shares, driving them up.

Sharp declines in the volume of shares traded were recorded in 1994, 1995, and 1996 to JD 430.3 million, JD 362.1 million and JD 210.0 million, respectively. Political uncertainty about the Middle East peace process, poor economic performance, and the policy of maintaining high interest rates to support the Jordanian dinar, were the major factors behind these declines. In 1997 and 1998, the volume of shares traded increased to JD 404.1 million and JD 413.6 million respectively, or an increase rate of 44.3 percent and 36.0 percent, respectively (see Figure 3.7).

Figure 3.7: Trading Volume in the Organised Market by Sector



Source: Amman Financial Market, The Twenty First Annual Report, 1998.

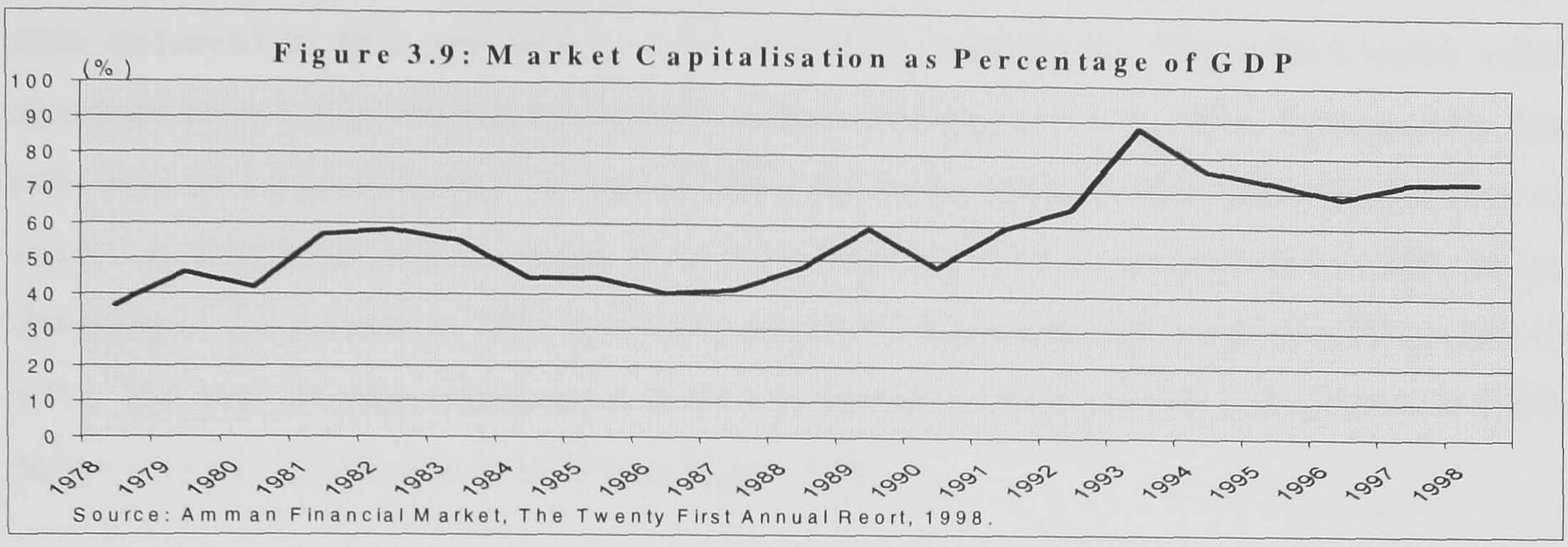
Market capitalisation at the AFM has grown in three phases. It has enjoyed rapid growth during the period 1978-83, from JD 286.1 million in 1978 to JD 1008.2 million in 1983, or at average annual rate of 28.6 percent. The following four years witnessed a decline in capitalisation at an average annual rate of 2.4 percent to reach JD 915.8 million in 1987. Real interest in the capital market in Jordan started to be shown after the economic crisis of 1988, when market capitalisation began increasing at a faster rate, reaching about JD 3,310.7 million in 1995 at an average annual rate of 15.5 percent. But it dropped by 2.4 percent in 1996 to JD 3,230.5 million, and then increased to JD 3,602.5 million and JD 3,835 million in 1997 and 1998, respectively, or at an annual rate of 11.5 percent and 6.5 percent, respectively (see Figure 3.8).

Figure 3.8: Market Capitalisation of Listed Companies on the Organised Market



Source: Amman Financial Market, The Twenty First Annual Report, 1998.

As a percentage of GDP, market capitalisation increased from around 38.3 percent in 1978 to around 73.2 percent in 1998 (see Figure 3.9). This is considered one of the higher ratios among the emerging markets, as indicated by IFC reports. This also highlights the important role of the capital market in the country's economy. The industrial sector leads the market with around 63 percent of total market capitalisation. Within this market capitalisation, AFM statistics indicate that non-Jordanians own about 44.3 percent of the market value. This percentage reached around 56.6 percent in the banking sector alone. In addition, the Government, through the JIC, by the end of 1998, held shares in around 20 companies listed in the AFM, with an approximate market value of around 11 percent of total market capitalisation. Their ownership is mainly concentrated in the mining and tourism industries, such as potash, phosphate, cement and some hotels.



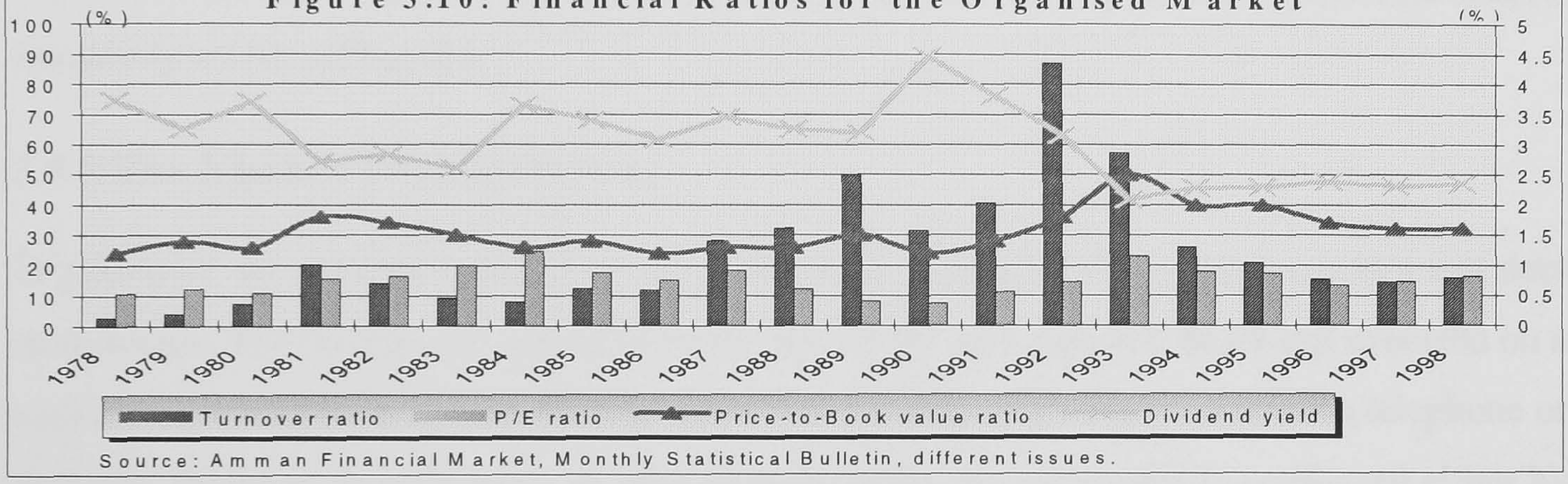
With respect to the turnover ratio, which is used as an indicator of market liquidity, this increased from 2.8 percent in 1978 to 20.4 percent in 1981, before declining gradually in the following three years to reach 7.9 percent in 1984, thereafter rising to its highest historical level of 87.1 percent in 1992. The main reason for this large increase in turnover ratio in 1992 could be the high level of liquidity in the financial sector as 350,000 expatriates returned to Jordan, bringing with them their life savings. Apart from bank deposits, the stock exchange was the only other major investment vehicle and as a result volumes grew by over 300 percent. Sharp declines in turnover ratio were recorded in the following six years and it reached 15.9 percent in 1998 (see Figure 3.10). This was due to political and economic uncertainties.

With regard to the visibility of the AFM, it is superior to many other markets in the region, and Jordan is one of the few countries in the Middle East to be represented on the Board of the International Accounting Standards Committee (IASC). Jordan has an institute of accountants which decides upon the auditing standards to be followed by Jordanian companies and which is attempting gradually to close the gap between local and international standards. All listed companies must publish audited financial statements within four months of the year-end. Six-month unedited interims are also required (a limited review by auditors is required for banks).

Historically, the price-to-earnings (P/E) ratio at the AFM has ranged between 7.5 and 24.7. The P/E ratio increased from 10.8 in 1978 to its historical high of 24.7 in 1987, before declining to 7.5 in 1989 and thereafter continuously increasing to reach 23.2 in 1993. The P/E

ratio dropped to 18.1, 17.4 and 13.5 in 1994, 1995, and 1996, respectively. Thereafter, this ratio increased to 14.7 and 16.4 in 1997 and 1998, respectively. The price-to-book value increased from 1.2 in 1978 to 1.8 in 1981, before declining to 1.2 in 1990. Subsequently this ratio rose to 2.5 in 1993. By the end of 1998, the price-to-book value ratio had declined to reach 1.6. Dividend yield increased from 2.3 percent in 1978 to 3.5 percent in 1980, before declining to 2.2 percent in 1981 and then rising to its historical peak value of 3.72 percent in 1984. The next six years witnessed a decline in this ratio which reached 1.85 percent in 1990, before rising to 2.3 percent in 1998 (see Figure 3.10).

Figure 3.10: Financial Ratios for the Organised Market



Source: Amman Financial Market, Monthly Statistical Bulletin, different issues.

4.4 Characteristics of the Market

The AFM consists of a broad spectrum of participants they includes companies, individual investors, institutional investors, financial institutions, and dealers with assigned responsibilities. Trading in the market is based on a continuous trading system. Each company has an assigned board on the trading floor and all trades have to be executed through a licensed broker on the floor.

In 1998, there were 33 brokerage firms licensed by the AFM to trade in the market. Fifteen of the brokerage firms were public shareholding companies dealing in new shares as well as buying and selling securities for their own account and for their clients against a commission in the Secondary Market. There were also 16 private shareholding brokerage companies. These also buy and sell securities on behalf of their clients against commission and sometimes

for their own account. Their legal set-up and nature takes the form of a limited liability company. The remaining two take the form of partnerships functioning only as a broker.

Investors in the AFM, especially in the Secondary Market, are of different groups. The breakdown of different types of investor is not documented. There is no available information on the percentage of individual investors as opposed to institutional investors, although this type of information is crucial. Currently, the main institutional investors in Jordan consist of the Social Security Corporation, the Jordan Investment Corporation (government agency), insurance companies, saving funds, and different employee provident and investment funds. The first two institutions have been mostly net buyers in the market and they do not participate frequently on the selling side.

3.4.1 The Market Trading System

In principle, the securities traded on the AFM are divided into two groups: equities and debt instruments. The buying and selling of orders is handled by licensed brokers and executed on a continuous action basis during trading hours. The passing of a client's orders via telephone or verbally, however, is acceptable as long as such orders are subsequently confirmed either by order forms duly filled and signed by the client, or by an equivalent statement transmitted in written form. Trading on the floor takes place in units, each worth JD 50 of the nominal value of the shares. Most shares have a nominal value of JD 1, with the exception of a few shares such as the Arab Bank with a nominal value of JD 10, the Jordan Petroleum Refinery (JD 5), and the Jordan Tobacco and Cigarette Corporation (JD 5). Therefore, a round lot (unit) is 50 shares for those whose nominal value is JD 1, and 10 shares for those whose nominal value is JD 5.

Settlements among brokers take place a spot basis at (T+1). Prices of shares are quoted in Jordanian dinar, and they change increments of JD 0.01 with a maximum change of 5 percent on the previous day's close imposed on the day movement of a share[6]. This ceiling is applied

[6] Such regulation has also been applied in numerous emerging stock markets (*e.g.,* in China, Lithuania, Poland, Turkey, South Korea) and also in some mature ones (France). Theoretically, it is widely argued that if the price is not allowed to settle at its equilibrium level because of the presence of institutional constraints, demand may not match supply (or vice versa) and disequilibrium occurs (see Cou, 1997; and Shen and Wang, 1998). Charemza *et al.,* (1997), however, have shown that the appearance of such constraints does not necessarily imply inefficiency.

to prevent large price fluctuations, to eliminate unnecessary speculation, and to protect the interests of small investors[7]. The only exception to this rule occurs when there is a stock dividend and a price adjustment is required, or when a company is initially listed, in which case its price is floated for 15 minutes and the base price is then set for that day.

Currently, the AFM keeps an up-to-date record of all transactions and all traded shares are registered. Registration takes place the day following the trade day, when the brokers record the transaction with the AFM. The AFM is given two business days afterwards to update its records and to deliver all transactions (contracts) to the issuing companies who should update their records accordingly within three business days. The usual full settlement time-frame for equity should be a maximum of six business days (T+6).

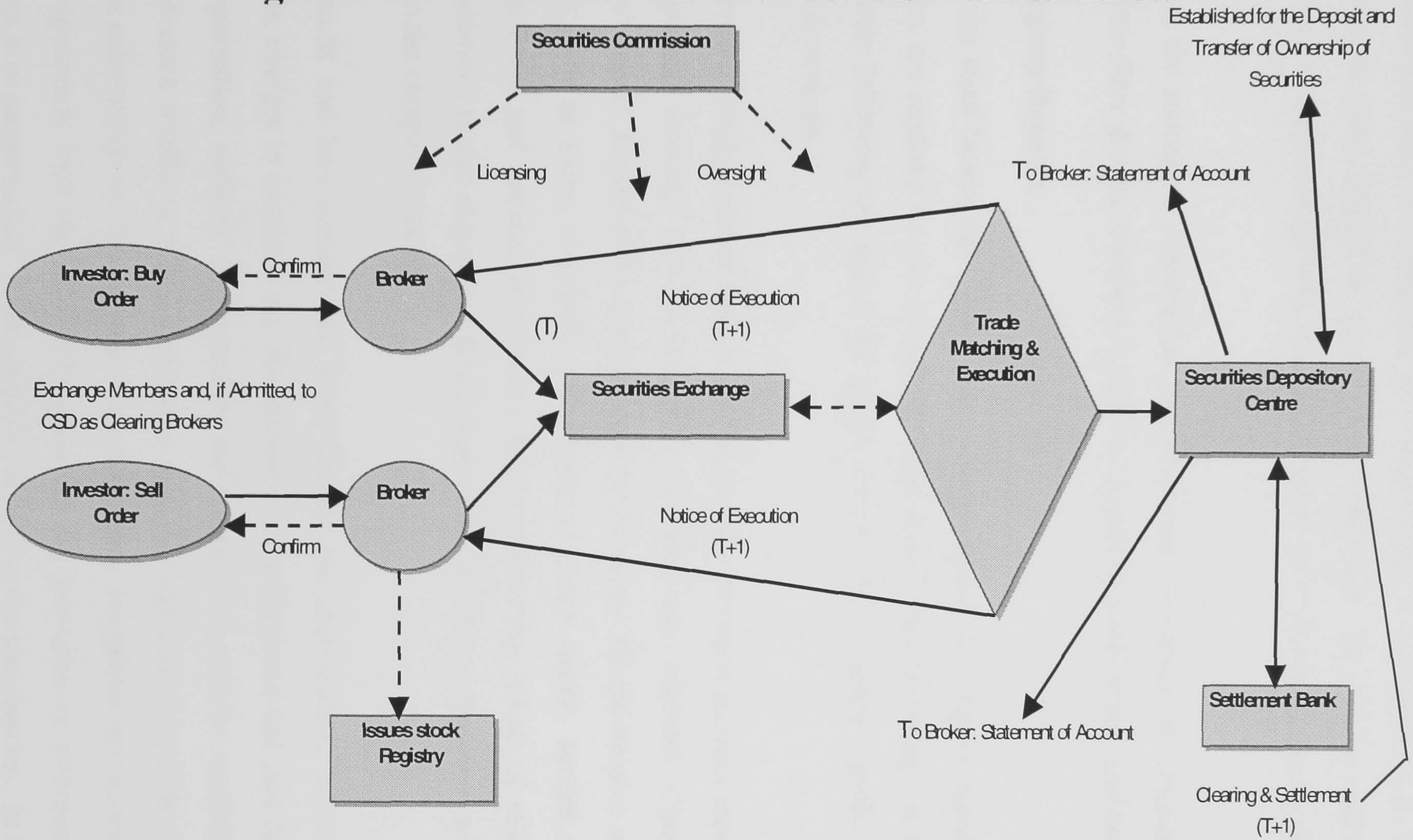
In 1997, as mentioned earlier, a new securities law was enacted to reflect the development of systems and the sophistication of new products and participants. According to this law, trade conformation available electronically and manually at least by the end of the trading day, which would increase the speed of transactions and registry and reduce the costs of intermediation[8]. At T+1, the trade confirmation will be transmitted to the Securities Depository Centre (SDC) for clearance and settlement. Integrated with the settlement bank, the SDC should be able to both confirm title of the security by seller, and necessary funds for the buyer (who will necessarily have at least one account at the settlement bank), and will achieve true Delivery Versus Payment (DVP) settlement at T+3 upon confirmation and processing of the information (see Figure 3.11).

Many studies also argue that the absence of price limits cause anomalies causing in turn a lack of efficiency (see Claessns *et al.,* 1995; Richards, 1996).

[7] However, some empirical evidence from emerging markets suggests that trade barriers increase, rather than decrease portfolio risk. Charemza and Majerowska (2000), for example, seriously criticise the effectiveness of price limits, since price limits are expensive, increase market inefficiency and increase portfolio risk.

[8] At the beginning of April 2000, the automated trading system was introduced. This is an important innovation in the market microstructure, and perhaps the most important development in the history of the Jordanian stock market, allowing every transaction taking place at the AFM to be conducted through a central computer network. The process allows quick documentation of all dealings, and, more importantly, it will offer easy access for investors into details of the market situation and thus facilitate the entry of foreign capital into the market. See for example Economides and Schwartz (1995) and Economides (1995) for a more detailed discussion of the benefits of introduction of electronic trading systems in stock markets.

Figure 3.11: Securities Law Market Overview and Transaction Flow



Source: Amman Financial Market.

3.4.2 Available Market Information

In any particular area of investment, as is well known, it is imperative to bear all available information in mind. Indeed to try and invest rationally, the investor will have to consider factors such as economic growth, company reports, government economic policies and many others.

In Jordan, the sources of information available about investment in company shares can be divided into three groups: company reports, stock market publications, and brokers' research.

I. Company Reports.

Perhaps the most factual and direct source of information is company reports. All the listed companies are required by law to publish their annual reports during the first four months immediately following the end of the financial year. These include a profit and loss account and a balance sheet.

From a browse through annual reports, we can see that the main sections include notice of the annual general meeting, List of Directors, Secretary and Auditors, Chairman's Review, Directors' Report, Report of the Auditors and the Accounts. On the balance sheet are included measures such as loans, overdrafts and details of share capital, current and other assets including listed and unlisted investments, loans to directors, details of valuation of certain assets, additions to and disposal of fixed assets, arias of fixed cumulative investment and any change in the company's assets.

In the profit and loss account are listed charges for depreciation, interest on loans and overdrafts, charges in corporate tax, investment income, proposed and paid dividends, pension and compensation, auditors' remuneration and turnover. One of the conditions of entry into the listed stock market is that the company must be prepared to provide shareholders with sufficient information for its appraisal. To achieve this, companies are required to enter into a general agreement with the Stock Exchange for the provision of information. One of the provisions is to prepare a half-yearly report to be sent to the shareholders. In this report a half-

year statement of profit and loss and comparative figures for the corresponding period are provided. Supplementary information may also be provided by the Chairman's Report.

II. The Stock Market Publications

In its various publications, the AFM has been active in providing information about the listed companies. These include:

1. Monthly Statistical Bulletin

A monthly statistical bulletin is published by the AFM. It contains valuable data and the financial ratios of the listed companies. The bulletin includes cumulative market data, and sectoral data, as well as individual company data.

2. Annual Report

The AFM publishes an annual report on the market's activities during the year. For example, the number of shares traded, their market value, number of transactions made, companies which have offered new issues, companies' authorised capital and other similar information are included. The report also lists all the licensed brokers, the achievements of the Market and the Chairman's view regarding future plans.

3. Companies Guide

The AFM also publishes the Jordanian shareholding companies guide on an annual basis, to provide interested parties with a reference that contains important information. The guide includes valuable data and the financial ratios of listed companies, in addition to information about numbers of shareholders, ownership ratios, the number of employees in each company and their balance sheets and profit and loss cost account for the past five years. In addition, the rules and regulations of the Market, Companies Law, Banks Law, and Insurance Law are also published.

4. Daily Official List

Prices of traded shares are quoted on a daily and weekly basis through the local Arabic and English newspapers, reporting the total number of traded shares, their market value, the number of transactions made, the closing price and the nominal value of the quoted shares. In

addition, a short daily price quotation is broadcast on Jordan Television. The closing prices of Jordanian shares listed and traded are quoted and transmitted also via Reuters Monitor Network worldwide. In addition to Reuters, private companies have begun participating in the disclosure process by facilitating access to information on the market via computer modem and telephone services.

III. Brokers Research

Although brokers in Jordan have not been active in conducting research on the market or on listed companies in the past for of several reasons, mainly the small size of the market, many have recently started doing so. There are several brokerage houses that have started conducting activities in the market, as well as keeping a database on prices and company results. This information is usually supplied to major investors when it is required. There are several international institutions that also provide information about the market and companies in the market. The IFC, for example, covers Jordan in their emerging markets reports; and the HSBC, Worldscope and Meedmoney magazine cover Jordan in their publications.

3.4.3 Foreign Investment

The remarkable role that the AFM is playing in mobilising funds and providing investment channels on national and international levels was the driving force behind the continuous efforts to modernise and improve the efficiency of the Market, through new legislative reforms, efforts to automate trading and the depository and the settlement systems, in accordance with international standards. As part of these efforts, as mentioned before, a new securities law was passed in 1997. The new securities law came as a part of the new regulatory and legislative reforms, aimed at liberalising and increasing the openness of the economy in order to create a better local climate and attract foreign investments.

The most important development in the new law was the abolition of the non-Jordanian ownership ceiling of 50% and allowing non-Jordanian investors to own up to 100% of any companies in any sector of the economy, except for the sectors of construction contracting, trading and trade services, and mining. The underlying argument for this reform is that the Government has realised that more opening the stock market to foreign investors has many

benefits. It represents an opportunity to attract foreign capital to finance economic growth. By raising the demand for shares on the stock market, foreign investment liberalisation also lowers the cost of capital for local firms[9] and adds to their incentives for going public, which in turn makes the market more liquid and efficient[10] and increases the market size. This, in turn, increases local investors' opportunities for portfolio diversification, which raises their incentive to invest in shares[11].

The Jordanian Government imposes no restrictions on repatriation of capital if the original amount is transferred to the country through a bank. The initial investment and any capital gains or dividends can be transferred freely with no restriction. When dividends, which are distributed annually, are declared, they are tax-exempt for Jordanians as well as for foreigners investing in Jordan. Shares are traded ex-dividend on the day following the general assembly meeting, which is usually held during the first four months of each year. In addition, capital gains from trading or investing in Jordanian stocks are also exempt for both Jordanians and foreigners. Such tax exemptions have contributed significantly to giving the AFM a competitive edge on an international level.

It is worth mentioning that abolishing the ownership ceiling besides other legislative reforms had a direct effect on foreign investment at the AFM. As shown in Table (3.2) the value of buy orders in 1998 amounted to JD 205.0 million, compared with JD 26.5 million in 1996, an increase of JD 178.5 million or 673.6%. The sell orders amounted to JD 80.7 million, compared with JD 17.9 million in 1996, an increase of JD 62.8 million or 350.8%. As a consequence, the net investment for non-Jordanians in 1998 amounted to JD 124.9 million, compared with JD 8.5 million in 1996, an increase of JD 119.4 million or 1404.7%.

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[9] Stulz (1997,1999), Bekaert *et al.,* (2000a,b), Kim and Singal (2000) and Henry (2000a,b) provide three reasons why stock market liberalisation might cause a fall in the liberalising country's cost of equity capital. First, stock market liberalisation might increase net capital inflows and an increased net capital inflow could reduce the risk free rate. Second, allowing foreigners to purchase domestic shares facilitates risk sharing between domestic and foreign investors and should reduce the equity premium. Finally, increased capital flows should increase stock market liquidity, and thereby reduce the equity premium.

[10] Buckberg (1995) and Kim and Singal (2000) provided some evidence that opening up stock markets improves markets' efficiency.

[11] For more a detailed discussion of the benefits of open stock markets to foreign investors see, for example, Hargis (2000), Bekaert *et al.,* (2000a,b) Kim and Singal (2000) and Bekaert and Harvey (2000).

Table 3.2:Trading Volumes of Non-Jordanian Investors in Shares

(JD Million)

Year	Buy			Sell			Net Investment
	Companies	Individuals	Total	Companies	Individuals	Total	
1996	16.5	10	26.5	7.5	10.4	17.9	8.6
1997	82	18.5	100.2	28.8	14.6	43.4	56.8
1998	187.8	17.2	205	69.5	11.2	80.7	124.3

Source: AFM, Monthly Statistical Bulletin, December 1998.

Also in light of the developments in investment of non-Jordanian investors, the percentage of their ownership of market capitalisation increased gradually from 31.1 percent in 1994 to reach 45.9 percent in 1998. According to the sectional contribution of non-Jordanian investors in the capital of shareholding companies, banks and finance companies occupied the first rank at an average of 50.2 percent of the total market capitalisation during the period 1994-98, followed by the industrial sector at an average of 23.9 percent, the insurance sector at an average of 15.8 percent, and finally, the services sector at an average of 6.9 percent (see Table 3.3).

Table 3.3: Non-Jordanian Ownership in the Share Holding Companies

(%)

Year	Banking and Finance	Insurance	Services	Industry	All Sector
1994	46.7	16.0	2.9	23.6	31.1
1995	46.3	15.7	3.3	19.9	31.0
1996	47.7	16.5	7.3	21.8	32.8
1997	53.8	16.0	79.3	26.0	39.1
1998	56.6	15.1	10.8	27.6	44.3

Source: Amman Financial Market, The Twenty First Annual Report, 1998.

2.4.4 The Price Index

Since 1980, the AFM has had a price index. This indicator was developed to represent the general trend of the Market. In 1992, the price index was revised and updated in co-operation with the IFC of the World Bank. The methodology chosen to construct the new price index was based on market capitalisation, which is similar to the methodology used by the IFC in constructing their indices and in calculating many other indices such as the Standard & Poor indices. More particularly, in the new price index, besides including companies most representative of their sector, factors such as market capitalisation and liquidity are taken into

consideration. In general, the index can be considered as an indicator of value, taking prices into consideration.

In 1993, the AFM started publishing this Price Index with its daily stock price list. The base year used for the index was 1991 and a modification of the previous years was done to correspond with the new chosen sample. The sample initially included 50 companies to represent the broad market based on sectoral representation, market capitalisation and liquidity. The sample was revised in 1994 to include 60 companies. Figure (3.12) shows the developments in the prices based on the above measure of the price index from 1978 to 1998. The share price index of the AFM clearly establishes the strong correlation of the stock market with economic activity and the political situation.

3.5 The Development of the Market in Comparison with Worldwide Stock Markets

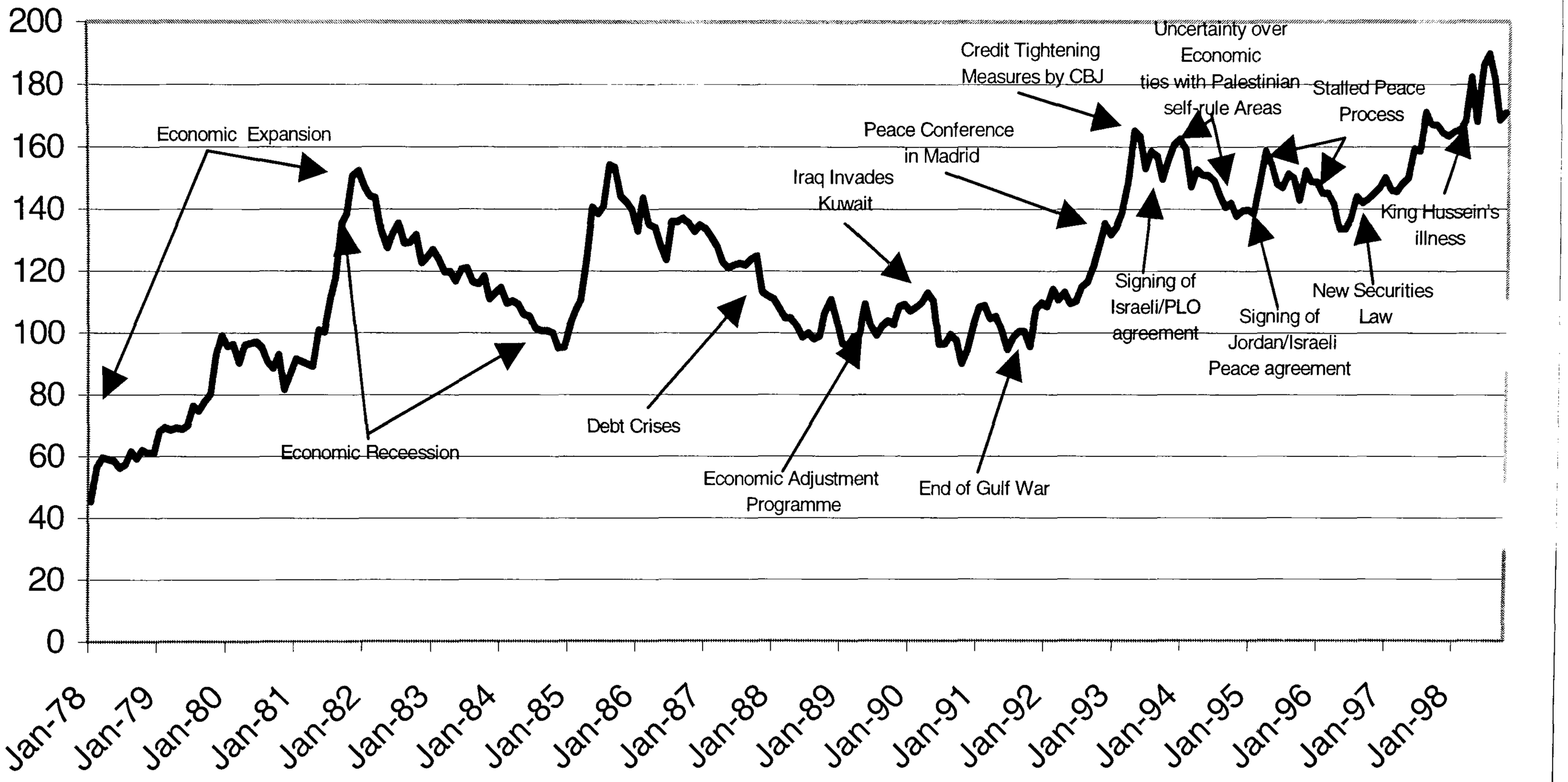
Global Emerging Markets Research of Baring Securities in 1994 argued that the AMF has experienced an impressive development since its establishment in 1978; it has become one of the most active and organised markets among the emerging markets. It is also playing an important role in the financing of development in Jordan. However, stock market development is a multidimensional concept. The term stock market development is associated with size, liquidity, stability, regulatory and institutional environment, and integration with the world's capital markets.

In order to investigate the development of the AFM in comparison with other emerging as well as developed markets, we used indicators to suit the purpose of the concept of market development. This is done by constructing proxies that measure stock market development. While none of them measure stock market development exactly, taken together, they provide a reasonable representation of the extent of stock market development and are indicators the most commonly used by academics and practitioners[12].

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[12] See for example Demirguc-Kunt and Levine (1996a) and Beck *et al.*, (1999a).

Figure 3.12 : General Price Index



Source: Amman Financial Market Database.

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We used sixteen related stock market development[13]: three measures of stock market size, two measures of stock market liquidity, one measure of stock market stability, two measures of stock market concentration, two measures of stock market integration with world capital market, five measures of stock market regulatory and institutional environment and one for market transaction costs. Furthermore, to produce an assessment of the overall of the AFM development in comparison with other markets, we calculate indices of stock market development that average together the information contain in the individual indicators.

3.5.1 Stock Market Size

There are three indicators used to measure stock market size: market capitalisation adjusted for size of economy, number of listed companies and average size of companies. Market capitalisation refers to the total value of listed shares on the stock exchange. Capitalisation of a company is calculated by multiplying the number of that company's shares which are outstanding by its share price. To calculate market capitalisation, this information is aggregated for all companies listed on the stock market. Since large economies are bound to have a large market capitalisation, this variable is adjusted for size of economy by dividing by GDP. The assumption underlying the use of this variable as an indicator of stock market development is that the size of the stock market is positively correlated with the ability to mobilise capital and diversify risk. Bekaert and Harvey (1997) also suggest that the size of the stock market may reflect the degree of market integration. Larger market capitalisation relative to economic activity suggests that the country is more likely to be integrated into world capital markets.

As shown before, the AFM has developed rapidly since its establishment as illustrated by the rise in capitalisation as a percentage of GDP, which was about 68 percent on average during the period 1986-1997. As is evident from Table (3.5), this is one of the highest ratios among emerging markets, such as Brazil (18%), India (21%), Greece (14%), Korea (37%), Turkey (13%), and Mexico (28%), as well as some developed markets, such as Austria (13%), France (31%), Germany (26%) and Canada (64%).

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[13] We will use some these indicators *i.e.,* quantitative ones, in the following empirical chapters.

The second indicator used to measure stock market size is the number of listed companies. In general, more developed markets have a larger number of companies listed on their stock exchanges. One reason why a larger list of companies implies a more developed stock market is that in mature markets, it is relatively easy to list the companies on the exchange. Cumbersome listing rules (as are prevalent in undeveloped markets) deter many companies from listing.

With an average of 103 listed companies during the period 1986 to 1997, Jordan is one of the largest Middle East markets in the region: Morocco (28), Kuwait (56), Saudi Arabia (65), Tunisia (20), but it is still small compared to other emerging markets as well as developed markets such as India (4826), Brazil (562), Korea (682), Greece (174), Turkey (168), France (597) and Germany (564). This may indicate that it is relatively difficult for companies to list on the Jordanian stock exchange. Actually, the limited number of companies listed on the AFM is related to the fact that many Jordanian companies remain family-owned businesses with no interest in going public. Their refusal to issue-publicly held equity is based on a fear that they will lose control and be forced to disclose what is believed to be personal information.

The average size of the companies listed in stock markets provides an idea about the number of shares available for trading. Small size companies listed on the stock exchange implies that a smaller number of shares is available for trading, which initially deters investors from entering the market and, at a later stage, when trading is active, results in violent price movements. Average company size is calculated by dividing the total market capitalisation by the number of listed companies. With an average size of US$ 93.2 million from 1986 to 1997, Jordan has very small size companies compared with other emerging markets and compared with developed markets, for example: Brazil (US$ 476.6 million), Greece (US$ 148.5 million), Indonesia (US$ 103.2 million), Turkey (US$ 237.7 million) and Mexico (US$ 970.9 million) (see Table 3.4).

3.5.2 Liquidity

Liquidity refers to the ease and relatively low cost of buying and selling securities. A more liquid stock market can encourage investors to acquire more information about firms, and allows them to alter their portfolios quickly and cheaply. Thus, a more liquid stock market makes investment less risky and facilitates long-term, more profitable investment. A comprehensive measure of liquidity would quantify all the costs associated with trading, including time costs and the uncertainty of finding a counterpart and of settling the trade. To analyse the liquidity of the Jordanian market compared with other emerging and developed countries, we use two related measures: turnover ratio and value traded adjusted for the size of the economy (GDP).

Value traded (adjusted for the size of the economy) refers to the value of all trades in the stock exchange. This measure is divided by GDP to adjust for the size of the economy. The ratio of organised equity trading as a share of gross domestic product positively reflects liquidity on an economy-wide base. As is evident from Table (3.4), with about 18.5% of total value/GDP ratios, Jordan has a liquid market compared with Middle Eastern markets and most emerging markets *i.e.* Egypt (3.9%), Lebanon (0.7%), and Morocco (2.8%), Greece (4.7%), Turkey (10.1%), India (9.7%), and Mexico (12.4%). Compared with developed markets such as Canada (31.6%), Australia (35.7%), Germany (35.9%) and Japan (46.5%), Jordan has a relatively illiquid market.

Turnover ratio equals the value traded divided by market capitalisation. It measures the size of equity transaction relative to the size of the equity market. High turnover ratio is often used as an indicator of low transaction costs. With about 26.5% of turnover ratio during the period 1987-97, Jordan has a higher turnover ratio when compared with some emerging markets such as those in Chile (9.2%), Morocco (10%), South Africa (14%), Pakistan (9.9%), and Tunisia (8.7%). When compared with other emerging as well as with developed markets such as those in Argentina (41%), Brazil (69.8%), Turkey (78.8%), France (49.6%), Germany (142.8%) and others, Jordan exhibits a relatively low turnover ratio.

The relatively low liquidity of the AFM compared with some emerging markets as well as developed markets is primarily due to the following factors: (i) the current method of trading on the exchange: there are no market makers which tends to limit the size of trades that can be executed; (ii) a substantial government's share portfolio, a significant portion of which is not traded; and (iv) the relative lack and undevelopment of institutional investors, *e.g.* pension funds, insurance companies and mutual funds.

It is important to note that there is an argument to show that liquidity may not be an appropriate indicator of stock market development. Most researchers agree that investors do not want investable funds tied up for long periods of time, which would be necessary for the financing of long-term projects by firms. Equity markets allow firms to receive the funds needed for long-term finance but also provide the liquidity required by investors. Singh (1997a) however, argues that this turns equity markets into casinos which suffer from "*short-termism*" where investors have short-term horizons and misguided expectations. Thus, according to this argument, excessive liquidity could be an indicator of market inefficiency and volatility.

3.5.3 Market Concentration

Stock market concentration refers to that select little scrip that dominates market activity. In certain emerging markets, while there may be both high capitalisation and volume, a few companies dominate the market. Such high concentration may not be desirable, since it affects liquidity. Moreover, the large volume of trading activity may be mistakenly interpreted as a sign of a developed stock market. Therefore, any measure of stock market development should include a proxy of market concentration.

There are two indicators used to measure stock market concentration: the share of market capitalisation accounted for by the ten largest stocks and the share of market trading value accounted for by the ten most active stocks. Like most emerging markets, as is evident from Table (3.4), Jordan exhibits a high market concentration. The largest ten companies account for 59.7 percent of the market capitalisation. Also the ten most active traded stocks with respect to trading volume accounted for 51.2 percent of total volume traded in the market. It is

important to note here that capitalisation concentration has declined over the last few years in this market. There has been an even more significant decline in the share of value traded by the most active stocks, which attests to the increased breadth and depth of the market.

3.5.4 Stability

No set of measures of stock market development would be complete without a measure of the stability of the market because volatility of stock returns is another attribute that has received great attention in the theoretical literature and is of great interest to practitioners. One of the simplest methods of measuring stability is to observe the movements in stock prices and hence market returns. In simple terms, less volatility implies greater stability and as a result greater stock market development. This conclusion may not be entirely correct. Indeed, many observers would argue that high volatility could be an indicator of development, in that revelation of information would lead to its being incorporated in stock prices (Bekaert and Harvey, 1995a).

The IFC provides a calculation of standard deviation of stock market returns for both emerging and developed markets based on 60 months of statistical data for stock market returns. Based on this statistical reference, the Jordanian stock market is shown to have a standard deviation of (0.0388) during the period from 1986 to1997. Compared with both emerging and developed markets, the Jordanian stock market exhibits very low level of volatility[14], which may indicate that Jordan has a relatively stable stock market. This may indicate also that the AFM is efficient[15]. It is well known that in an efficient market, new information will be correctly and quickly incorporated into prices and even though that may entail price jumps, prices overshooting and deviations from the equilibrium are reduced in efficient markets. Thus, holding all else constant, efficient markets will be less volatile than inefficient markets.

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[14] This view is consistent with the findings in Bekaert and Harvey (1995a, 1997); Erb, *et al.*, (1995, 1998); El-Erian and Kumar (1995), Rouwenhorst (1999) and Kim and Singal (2000). The low level of volatility returns may imply that the equity capital cost in Jordan is relatively low.

[15] In a recent empirical work, Wright (1999) investigates the long memory in stock returns for 17 emerging markets including Jordan. Among very few emerging markets, he finds no evidence of long memory in Jordan stock market returns, which implies market efficiency.

Table 3.4: Indicators of Stock Market Development, 1986-1997

(Annual Average)

Country	Market Capitalisation (%)	No. of Listed Companies	Average Co. Size (US$ M)	Total Value Traded/GDP (%)	Turnover Ratio (%)	Concentration		Volatility (%)
						Capital Indicator	Activity Indicator	
Argentina	11	166	435.7	4.6	41.5	51.9	85.4	8.80
Australia	89	1155	571.5	35.7	40.2	N	N	N
Austria	13	112	353.7	9.1	69.8	N	N	N
Bangladesh	20	152	7.5	2.5	12.6	N	N	N
Brazil	18	562	476.6	12.6	67	42.4	63.7	11.09
Canada	64	1177	416.8	31.6	49.2	N	N	N
Chile	62	226	244.2	5.7	9.2	42.2	58.3	6.96
China	6	216	170.1	12.3	201.6	13.9	13.8	18.24
Colombia	11	118	103.3	0.9	8.5	49.8	67.8	6.93
France	31	597	987.4	15.2	49.6	N	N	N
Germany	26	564	1178.9	36.9	142.8	N	N	N
Egypt	18	626	32.0	3.9	22.3	29.8	36.4	8.34
Greece	14	174	148.5	4.7	34.7	61.1	50.1	6.43
India	21	4826	22.0	9.7	46.5	24.8	81.1	8.42
Indonesia	23	184	103.2	10.6	46.4	47.6	32.1	10.97
Israel	29	449	70.7	13.9	48.4	38.8	32	6.39
Japan	93	2163	928.7	46.5	50.3	N	N	6.91
Jordan	67	105	39.2	18.5	28.5	59.7	51.1	3.88
Korea	37	628	54.0	51.8	140.4	38.8	12.5	9.03
Kuwait	N	56	349.8	N	N	N	N	N
Lebanon	N	6	322.7	0.7	N	N	N	N
Malaysia	117	420	132.2	56.6	48.5	36.4	15.5	8.80
Mexico	26	198	790.9	12.4	48	35.5	45.6	10.26
Morocco	28	68	248.5	2.8	10	65.2	73.4	4.96
Nigeria	6	135	20.0	0.1	2.3	45.8	57.2	18.90
Oman	N	64	62.4	N	N	N	N	N
Pakistan	14	620	14.0	1.3	9.9	66.8	90.5	8.80
Philippines	54	178	141.9	15.6	29	48.1	35.2	9.42
Portugal	18	176	263.2	7.8	42.9	83.3	67.5	5.11
Saudi Arabia	10	65	848.4	N	N	N	N	N
South Africa	161	680	361.5	22.5	14	26.1	27.6	6.47
Spain	29	390	756.2	29.6	102	N	N	N
Thailand	45	319	54.6	23.4	52.2	N	N	N
Tunisia	20	24	68.0	1.7	8.7	N	N	N
Turkey	13	168	237.7	10.1	78.8	54.2	33.7	17.59
UK	118	1959	928.7	51.9	44.4	N	N	3.59
US	81	7338	1277.7	89.1	110.3	N	N	3.03
Venezuela	14	100	160.2	3.2	23.1	61.5	65.8	13.16
Zimbabwe	31	60	30.8	2.6	8.4	67.4	42.9	10.95

Source: Author's calculations based on IFC, Emerging Stock Markets Factbook, different issues.

3.5.5 Market Integration

One of the most important indicators of the development of a stock market is its degree of integration with other stock markets around the world. To measure the degree of market integration, the standard practice is to use an International Arbitrage Pricing Model (IAPM)

and an International Capital Asset Pricing Model (ICAPM). Korajczyk (1996) uses a multifactor IAPM and ICAPM to measure stock market integration. These models imply that the expected return on each asset is linearly related to a benchmark portfolio, or a linear combination benchmark portfolio. In domestic versions of these models, the benchmark portfolios include only securities traded on the domestic exchange, while the international version includes all securities.

If the models are correct, then the benchmark portfolio should explain all the systematic expected returns on assets above the risk free interest rate. Under the hypothesis that the models are correct, any systematic deviation of expected return from a risk free asset is termed as excess returns on a risk free asset, or zero beta assets (an asset with zero correlation with a benchmarket portfolio. Korajczyk (1996), by using IAPM and ICAPM models, computes the systematic deviation between actual returns and those implied by the model.

In particular, for a benchmark portfolio, P, and given in assets and T period, consider the following regression:

$$R_{k,t} = \alpha_k + b_k \mathrm{P} + \varepsilon_{k,t} \qquad k = 1,2,\ldots,j;\ t = 1,2,\ldots,T, \qquad (3.1)$$

where $R_{k,t}$ is excess return on asset k, in period t, *i.e.,* the return above the return on a risk free or zero- beta asset, α_k is mis-pricing k relative to the benchmark portfolio.

If stock markets are perfectly integrated, then the intercept in a regression of any assets excess return on P should be zero, which implies that in a such market there is no excess return, or in other words,

$$\alpha_1 = \alpha_2 = \cdots = \alpha_j = 0 \qquad (3.2)$$

Accept of equation (3.2) implies efficiency and, therefore, market integration. The absolute value of the intercept term in equation (3.1) is taken as a proxy for market integration and the ability of an agent to diversify risk internationally. Thus a greater value of IAPM and ICAPM measures imply asset pricing inefficiency, and thus less stock market integration. According to Demirguc-Kunt and Levine (1996a), greater pricing errors reflect poor information about firms, high transaction costs, and official barriers to international asset trading. To compute

estimates of stock market integration for each stock market, Korajczyk (1996) computes the average of the absolute value of α_k equation (3.1) across all stock in each country, and he shows also that the greater excess return may reflect a variety of constraints to integration, higher official barriers to international trading, higher transaction costs, and poor information about firms.

Table (3.5) lists the Korajczyk measure of the average of the absolute value of $\alpha_{k,}$ under both IAPM and ICAPM across 24 countries' stock markets including Jordan, during the period 1986-1996. Both the IAPM and ICAPM measures give a similar result for Jordan: 2.53 under IAPM and 2.55 under ICAPM. Compared with both developed and emerging markets, Jordan's stock market appeared to have a low value of error pricing, which indicated a high degree of integration with other stock markets around the world and as well as market price efficiency[16].

3.5.6 Transaction Costs

Market microstructure is a key determinant of transaction costs (trading costs), directly through the institutional and competitive structure of the market, and more directly through any taxes or regulatory charges on market participants. Transaction costs, in turn, affect market performance through their effect on trading volumes. Therefore, the level of transaction costs may provide an indicator as to the development of market microstructure *e.g.,* regulatory regime, trading mechanisms, the type of information available to market participation and the manner in which incoming orders to buy and sell are matched.

Transactions cost may have several effects on a market's performance: for example, one might expect that increased transaction costs would increase the average holding period of securities (Harvey, 1994)[17]. However, the main effect of increased transactions costs is usually thought

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[16] This result is consistent with Bekaert and Harvey's (1995b) findings, who used the regime switching model to examine the time varying world market integration in twelve emerging markets including Jordan. They find that Jordan has a high degree of market integration with the world market estimated at 85% over all the sample period from 1978 to 1993 compared with (59%) for Chile, (14%) for Colombia, (54%) for India, (79%) for Malaysia, (21%) for Mexico (27%) for Nigeria, (89%) for Greece, (97%) for Korea, (89%) for Taiwan, (77%) for Thailand, and (47%) for Zimbabwe.

[17] Bulkley and Harris (1997), however, show that the reverse may be true, because increased transaction costs cause a bias in investment decisions towards assets with shorter pay-offs, thus reducing average holding periods.

to be that they reduce the incentive to trade, and therefore produce a thinner market. Thin trading tends to induce or increase autocorrelation in share returns and it also affects volatility. Another important effect of transaction costs relates to market efficiency. In general, regulatory policy has a direct impact on stock market efficiency in that trading arrangements, costs and taxes may produce too little or too much trading, and thus causes inefficiency (Stiglitz, 1989b; and Roll, 1989)[18].

Transaction costs include both the fixed costs associated with a trade, such as taxes and commissions, as well as the major costs that the market imposes: the bid/ask spread, which is the difference between the offer and bid price. The spread that investors pay for accessing the market reflects a combination of factors, including the differences of opinion held by buyers and sellers, but also including microstructure features. In some markets, for example, a market maker is responsible for quoting prices. He has responsibility for ensuring market liquidity, but the risk associated with that activity is reflected in the bid/ask spread, which is the source of returns on the market maker's inventory and for bearing risk. Alternatively, multiple market makers are possible and the competition this provides should reduce spreads. In markets like Jordan's, no designated market maker exists, perhaps reducing spreads even further, but, with no individual responsible for making the market, investors are exposed to the possibility of reduced levels of liquidity. Adopting a microstructure that allows for competition among traders may have a direct effect on trading costs.

Barings Securities provides information on transactions costs for many emerging markets. Barings Securities calculates the percentage spread as the difference between the offer and bid price divided by the average of the offer and bid price. Barings uses the mid-point in the divisor in order to avoid the problems caused by large fluctuations in the current price. The last column of Table (2.6) presents estimates of the percentage spreads from Barings Securities, based on snapshots of individual stocks during the weeks of July 17 and July 24, 1995. The country spreads are calculated by capitalisation-weighteding the percentage spreads of the individual firms within each country. As we can see from the numbers in the last column of Table (3.5), the percentage spread in Jordan is very low (58 bp) compared with the

[18] For empirical evidence see for example Green, *et al.*, (2000).

other countries included. For example, the spread in Chile is close to 400bp. In both Argentina and Turkey, the percentage spread is more than 150 bp.

Table 3.5: Indicators of Stock Market Development-Market Integration and Spread Analysis

	Country	Market Integration[a]		Market Spread (Basis Points)[b]
		IAPM Pricing Error	ICAPM Pricing Error	
1	Argentina	4.98	11.58	155
2	Australia	4.94	4.14	
3	Brazil	7.26	6.92	85
4	Chile	5.56	4.25	393
5	Colombia	5.62	4.82	100
6	Greece	5.29	5.23	48
7	India	3.33	2.89	150
8	Indonesia	3.68	3.03	112
9	Japan	2.39	2.26	
10	Jordan	2.55	2.05	58
11	Korea	3.73	3.18	41
12	Malaysia	3.90	2.45	69
13	Mexico	5.94	5.77	93
14	Nigeria	3.66	3.72	
15	Pakistan	2.59	2.15	38
16	Philippines	5.26	4.90	94
17	Portugal	4.02	5.28	93
18	Taiwan	5.68	3.18	47
19	Thailand	3.12	6.66	70
20	Turkey	6.38	2.56	160
21	United Kingdom	2.94	2.24	
22	United States	2.71	2.24	
23	Venezuela	6.67	5.15	
24	Zimbabwe	5.57	5.18	

Source: (a) Korajczyk, A. (1996). (b) From Barings Securities (July 1995).

2.5.7 Regulation and Institution Indicators

Qualifying the extent of stock market development also requires a look into the institutional aspects of the country's market environment, it's underlying legal and tax framework, its accounting standards and also its provision of a regulatory mechanism. In general developed stock markets have prudential supervisory bodies, information disclosure, low transaction costs, and short settlement times in case of disputes over financial and other contracts.

The regulatory and institutional environment helps define the development stage of the stock market. Dividend repatriation rules, ceilings in equity returns, and tax laws influence the

extent and level of foreign equity participation. Standardised accounting rules instil investor confidence in the quality of information and data for companies. Accurate and timely publishing of key financial information such as pricing-earnings (P/E) ratios allow market watchers to process such information. All this promotes stock market development, by lowering the transaction costs for the use of equity capital.

In order to measure regulatory and institutional development as a proxy of stock market development, we use the indicators developed by IFC for its Emerging Markets database: regular publication of P/E ratio, accounting standards, investor protection, Securities Commission, and restrictions on investors. Unlike the financial indicators of stock market development which can be quantified, these indicators are relatively subjective.

A. **Regular publication of P/E ratios:** a regular publication of price-earnings ratios is one yardstick for judging how a company is doing and what kind of income potential it has in future, since companies with high P/E ratios are regarded as better investments. The IFC classifies the stock market regarding the published price-earning information into two groups: markets which publish this information are international and comprehensive, and the others are not.

B. **Accounting standards:** financial information may not be accurate or comparable from company to company without the adoption and enforcement of accounting standards, which are generally accepted. If foreign investment is to be encouraged, accounting practices need to be in line with internationally accepted accounting standards. To the question," *Does the country have internationally accepted accounting standards?*" The IFC classified the countries in three groups: countries that have good accounting standards, countries that have adequate accounting standards, and others that have poor (internationally accepted) accounting standards.

C. **Investment protection:** an important characteristic for the development of a stock market is the presence of protection mechanisms including provisions regarding the duties of insiders (directors and corporate officers), the rights and remedies of shareholders, disclosure and use of information by insiders, and takeovers and new issues. Also, creditors' protection

mechanisms are required. The most basic of these are rights to repossess collateral and to participate in key decisions such as filing for creditor protection and management during reorganisation. Strong disclosure and accounting standards and practices are essential for both equity and debt investors to monitor corporate performance. Legal and regulatory enforcement is also essential, of course, for these rules to have real content. The IFC classifies the countries according to the quality of their investment protection laws: countries that have good protection laws, countries that have adequate protection laws, and others that have poor protection laws.

D. Security Commission: it is widely agreed that an appropriate regulatory framework for securities is needed to increase investor confidence. Regulation is unlikely to be satisfactory if left entirely to the market. And also, in order for a market to operate, intermediaries (underwriters, dealers, brokers, research firms, and investment banks) between buyer and seller should exist. To make these institutions work as well, in facilitating an environment conducive to investment, brokerage rates, underwriting fees etc., must be high enough for these institutions to attract and still leave shareholders with an adequate return on capital. Having a Securities and Exchange Commission (SEC) does all this.

E. Restrictions on foreign investors: one issue of prime importance developing a stock market is the question of whether there are restrictions on repatriation of dividend income, capital and entry/exit of the firms. The integration globalisation of financial markets implies that there is free trade in financial services as well as in financial assets. While the scale of capital flowing to and from developing countries is substantial, the financial markets of some developing countries are closed, while others continue to restrict outward capital flows in an attempt to direct more domestic funds towards domestic investments.

The restrictions on foreign portfolio investors take many forms: formal or informal limits on the degree of foreign participation permitted in the market, formal or informal limits on foreign ownership of corporations, and rules governing hard currency repatriation of profits and capital by foreigners. These, restrictions could also take another form, if the country has a tax bias against equity finance, where a large percentage of capital gains and dividend income is withheld as taxes. This tax will discourage the investors from investing in these countries,

since they could seek a more profitable net return elsewhere. In this context, it is useful to note here that high capital gains taxes, or taxes on equity market transactions, can directly affect growth rates. These taxes alter resources allocation by reducing the expected after-tax resale value of companies' stock. This reduces the fraction of resources invested, and may thus have adverse consequences for growth.

The IFC classifies stock markets on the basis of their treatment of foreign portfolio investment into the following categories: free entry markets, being markets that have no significant restriction on purchasing or buying stocks; relatively free entry markets, being markets that have some restriction procedures required to ensure repatriation rights; special class markets, being markets that have restrictions to a certain class of stock designated for foreign investors; authorised investor markets, being markets where foreign investors might be approved in buying stocks; and closed markets. Being markets that are closed, or where access is severely restricted (*e.g.,* for non-resident nationals only).

With regard to the repatriation of profits or income (dividends, interest, and realised capital gain) and capital (initial capital investment), the IFC classifies stock markets into two categories: free stock markets, and stock markets that have some restrictions. In the free markets, repatriation is done routinely, while in other markets, repatriation requires some registration with or permission from a central bank, ministry of finance, or an official of exchange control that may restrict the timing of exchange release.

As it is evident from institutional development indicators, Jordan appears to have a more developed stock market compared to most emerging markets: the price-earning information is published internationally and comprehensively, accounting standards are good and internationally accepted, investor protection laws are adequate, listed stocks are freely available to foreign investors, income and capital are freely repatriated, and there is no tax on capital gains and dividends yield (see Table 3.6).

Table 3.6: Indicators of Stock Market Development-Institutional Indicators

Country	Publish P/E	Accounting Standard	Investor Protection	Restriction on Entry	Reparation of		Withholding Taxes (%)		
					Capital	Income	Interest	Dividends	Capital Gains
Argentina	C	A	A	F	F	F	0	0	0
Brazil	C	G	G	F	F	F	15	0	0
Chile	C	G	G	RF	SR	SR	15	30	35
China	C	P	P	SC		F	0	20	0
Colombia	C	A	A	AI	F	F	7	0	0
Egypt				F	F	F	0	0	0
Greece	C	A	A	F	F	F	15	0	0
India	C	G	G	AI	F	F	20	20	10
Indonesia	C	P	A	RF	SR	SR	20	20	0
Israel							35	25	0
Jordan	C	G	G	F	F	F	0	0	0
Korea	C	G	G	RF	F	F	13.2	16.5	0
Malaysia	C	G	G	F	F	F	15	0	0
Mexico	C	G	G	F	F	F	0	0	0
Morocco							0	10	0
Nigeria	P	A	A				10	10	10
Oman				F			0	0	0
Pakistan	C	A	A	F	F	F	10	10	0
Philippines	C	G	A	SC	F	F	20	15	0.5
Portugal	C	A	A	F	F	F	40	20	0
South Africa				F	F	F	0	0	0
Thailand				RF	F	F	15	10	0
Tunisia							20	0	0
Turkey	C	A	A	F	F	F	0	0	0
Venezuela	C	A	A	RF	SR	SR	0	0	1
Zimbabwe	C	A	A	RF	F	F	30	15	10

Source: IFC, International Stock Market Factbooks, 1994-1998.

Key:

Regular Publications of P/E: P =Published, C =Comprehensive and published internationally

Accounting Standards: G =Good, of internationally acceptable quality; A =Adequate; P= Poor, requires reform

Investor Protection: G =Good, of internationally acceptable quality; A= Adequate; P =Poor, requires reform

Restriction on entry: F=Free entry; RF=Relatively free entry; SC=Special Classes; AI=Authorised investors only.

Repatriation of income and capital: F=Free, SR=Some Restrictions

3.5.7 Stock Market Development Indices

While each of the indicators discussed above gives certain aspects of stock market development, it would be particularly difficult to assess the level of development of the AFM compared with other markets based on individual sets of indicators. Consequently, in order to provide a clearer picture of the development of the AFM compared with emerging as well as developed markets, we have used the IFC methodology developed by the Emerging Markets

database group and Demirguc-Kunt and Levine's (1996a) contract conglomerate indices of stock market development that aggregate information contained in individual indicators. Here we contract four conglomerate indices. As a first step for each country k, the mean removed value (X) is calculated for the following stock market development indicators: market capitalisation, traded/GDP and turnover ratios.

$$X(k)^j = \frac{[X(k) - mean(x)]}{\{ABS\,|mean(X)|\}} \qquad (3.3)$$

where $X(k)^j$ is the mean removed value of stock market development indicator X, for country k. Mean(X) is the average value of X across all countries from 1986 to 1997. ABS | mean (X) | is the absolute value of mean (X).

As a second step, we take a simple average of the mean removed market capitalisation, value traded/GDP and turnover ratios to obtain an over index of stock market development, INDEX A. INDEX B is contracted in the same way. It aggregates information on the three indicators used in INDEX A and IPAM pricing errors to option a more comprehensive index that incorporates international integration. Since IAPM provides data for only 23 countries, this index is only valid for 23 countries. INDEX C is similar to INDEX B, however it combines INDEX A with ICAPM pricing errors. Given data restrictions, it is computed also for 23 countries. Finally, INDEX C averages the mean removed values of market capitalisation, value traded/GDP, turnover ratio, IAPM pricing errors, market concentration, and market volatility. This indicator is computed for the 18 countries with data on all six underlying indicators. It is important to note here that for pricing error, concentration ratio and volatility, where a larger number refers to less stock market development, we multiply the indicator number by minus one before computing the means-removed values.

Table (3.7) gives the country-by-country values and rankings for the four aggregate indices. As is evident from this table, we can say that Jordan has a developed stock market compared with the emerging as well as with the developed markets. Particularly, INDEX A, which aggregates the information on market size and liquidity, ranks the AFM development thirteenth out of the thirty-five markets included in this index. INDEX B and INDEX C, which

combine INDEX A with price error measures (IAPM and ICAM), give similar results. They rank AFM development eighth among the twenty-three markets included in these indices. Finally, INDEX D, which aggregates information on market size, liquidity, international integration (IAPM pricing errors), market concentration and volatility, ranks AFM development third (after Malaysia and Korea) among the eighteen markets included in this index[19].

Table 3.7: Aggregate Index of Stock Market Development, 1986-1997

Country	INDEX A		INDEX B		INDEX C		INDEX D	
	Value	Rank	Value	Rank	Value	Rank	Value	Rank
Argentina	-0.5	26	-0.9	17	-1.31	23	-1.27	14
Australia	0.73	9	0.02	6	0.05	6		
Austria	-0.19	21						
Bangladesh	-0.68	32						
Brazil	-0.11	18	-0.98	21	-0.99	19	-1.08	10
Canada	0.51	11						
Chile	-0.28	22	-0.77	16	-0.74	14	-1.20	13
China	0.87	7						
Colombia	-0.82	35	-0.76	15	-1.15	22	-0.97	8
France	0.07	14						
Germany	0.98	6						
Egypt	-0.53	26						
Greece	-0.48	25	-0.92	19	-0.92	16	-1.50	17
India	-0.34	23	-0.69	13	-0.68	12	-0.93	4
Indonesia	-0.17	20	-0.58	11	-0.58	10	-0.95	6
Israel	-0.12	19						
Japan	1.04	5	0.39	5	0.40	5		
Jordan	0.14	13	-0.28	8	-0.26	8	-0.75	3
Korea	1.35	4	0.57	4	0.57	4	-0.35	2
Malaysia	1.4	3	0.58	3	0.66	2	-0.32	1
Mexico	-0.08	16	-0.61	12	-0.65	11	-0.94	5
Morocco	-0.63	30						
Nigeria	-0.62	27	-0.92	18	-0.93	17	-1.10	12
Pakistan	-0.77	34	-0.97	20	-0.96	18	-1.22	14
Philippines	-0.02	15	-0.55	9	-0.56	9	-0.96	7
Portugal	-0.37	24	-0.751	14	-0.84	15	-1.08	10
South Africa	0.92	8						
Spain	0.62	10						
Thailand	0.3	12	-0.26	7	-0.21	7		
Tunisia	-0.72	33						
Turkey	-0.10	17	-0.53	10	-0.70	13	-1.03	9
UK	1.39	2	0.63	2	0.64	3		
US	2.17	1	1.23	1	1.24	1		
Venezuela	-0.67	31	-1.07	23	-1.05	21	-1.50	17
Zimbabwe	-0.62	27	-1.03	22	-1.02	20	-1.42	16
No. of Countries	35		23		23		18	

Source: Author's calculations.

[19] These results are consistent with Demirguc-Kunt and Levine (1996a, Table 4), and Levine and Zervos, (1996, Table 1).

3.6 Sammary and Conclusion

The AFM has developed greatly since its establishment and has succeeded in accomplishing several of its goals by mobilising capital into the productive sectors of the economy. This is evidenced by the level of high activity in the Primary Market over the last decade. It also highlights the importance of the Capital Market to the national economy when comparing the size of the market to GDP. When comparing the AFM with other emerging markets, this market appears to be well organised, attractive, and well managed with much potential for growth. In fact, the AFM today ranks among the leaders of the emerging markets. Unfortunately, AFM development in the last few years has been constrained by lingering high interest rates which have driven whatever financial market liquidity that exists into short-term time deposits.

The AFM is considered to be one of the most liquid and active bourses in the Middle East. However, as shown by the relative weakness of the AFM over the last few years, the market remains sensitive to economic and political developments (especially the Middle East peace process). This in turn is a reflection of the thinness of the market and the dependence of the small Jordanian economy on the other countries in the region and on their prospects. However, it is clear that the AFM's past record of performance places it in a strong position to provide increasing amounts of equity capital to Jordanian companies. When viewed in the context of Jordan's pivotal role in the Middle East process, the AFM has the potential to develop into a regional securities market, attracting global funds for companies in the region.

The AFM can also play a significant role in the planned privatisation of public sector enterprises in Jordan. This role can be in the form of evaluating stocks of public sector enterprises offered for sale, providing funds necessary for investors in stocks, providing hire-purchase funding for the small investor, and transforming part of the debt of public sector enterprises into equity shareholding. This will rectify their financial structures and enable the promotion of their shares when they are offered for sale, as well as assisting in the establishment of investment funds to place investors' funds in stock and widening ownership of shares.

Despite the accomplishments so far, the AFM has much room for improvement to become a regional financial market in the future. And there are several comparative advantages in this market, which should be further developed in order to improve its efficiency and to attract international investments, which would increase the depth of the market and enable it better to compete at emerging markets level.

Chapter IV

Literature Review

4.1 Introduction

Much of the criticism of the development of stock markets, especially in developing countries, arises from the speculative nature of these markets. Critics claim that to a large extent, the observed prices and their movements are not captured by so called "*market fundamentals*" (Shiller, 1981), and this has adverse implications for capital formulation and economic growth (De Long *et al.,* 1990). Some critics argue that stock market discipline cannot be enforced in developing countries due to information problems, lack of prudent regulatory bodies, high transaction costs, inadequate competition, and a lack of investors due to imperfect information flows.

Furthermore, some researchers have concluded that banks are more suitable than stock markets for developing countries in particular (Stiglitz, 1989a; Collier and Mayer, 1989; Cobham, 1995; and Dow and Gorton, 1997), and that stock markets do more harm than good (Singh, 1992a, 1996, 1997a, 1999). Singh, for example, argues that some characteristics of mature stock markets, such as volatility, deterrence of risk-averse savers and the demands of speculative investors for short-term profits at the expense of long-term growth, were likely to be a far larger problem in developing markets and to have a negative impact on the country's overall development.

In terms of theory, researchers hold different opinions regarding the importance of stock markets for economic development. A growing theoretical literature argues that stock markets are importantly linked to economic growth. They provide services that boost economic growth. For example, Greenwood and Smith (1997) show that large capitalised stock markets can facilitate investments in the most productive technologies projects, by lowering the cost of mobilising savings. Levine (1991), Bencivenga and Smith (1991), Bencivenga *et al.,*

(1995,1996), Diamond (1996), Greenwood and Smith (1997), and Fulghieri and Rovelli (1998) and others argue that stock market liquidity is important for economic growth. Moreover, Grossman and Stiglitz (1980), Merton (1987), Bhide (1993), and Holmstrom and Tirol (1993) and others argue that liquid stock markets can increase incentives to acquire information about firms and improve corporate governance. Obstfeld (1995) and others show that international risk sharing through the integration of stock markets improves resource allocation and thereby accelerates the rate of economic growth. Finally, Cham *et al.,* (1999) argue that beside the traditional channels, stock markets are an important path through which monetary policy affects economic growth.

However, Mayer (1988) shows that even large stock markets are unimportant sources of corporate finance. Stiglitz (1985, 1993) argues that stock market liquidity will not enhance incentives for acquiring information about companies or exerting corporate governance. Further, Tullio and Pagano (1994) show that greater liquidity of stock markets reduces uncertainty and this in turn may reduce savings rates to the extent that economic growth decelerates. Moreover, Devereux and Smith (1994) argue that greater risk sharing through internationally integrated stock markets can reduce savings rates and thereby slow economic growth. Finally, Morck *et al.,* (1990) and others emphasise that stock markets can damage economic growth by easing the corporate takeover mechanism.

With regard to empirical work on the role of stock markets in the economic development process, there seems to be a lack of research in this direction. Part of the problem lies in the absence of indicators that can accurately measure the extent of stock market development. For a long time academics had neither a common concept nor a common measure of stock market development (Demirguc-Kunt and Levine, 1996a). With the exception of work such as that of Atji and Jovanovic (1993) and Levine and Zervos (1996, 1998a) at macroeconomic level and Demirguc-Kunt and Maksimovic (1998, 2000), Rajan and Zingales (1998), and Beck and Levine (2000) at firm and industrial level[1], this topic has been virtually ignored.

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[1] These works will be discussed in detail in the following chapters.

In this chapter we survey the literature on the stock markets-economic growth nexus in order to put the research on this topic into perspective. The survey begins by reviewing the theoretical growth literature. Then the theoretical literature on stock market functions is reviewed. In this review we focus on the ties between economic growth and the quality of the functions provided by stock markets which play critical roles in an economy. These functions include facilitating liquidity, risk diversification, information production, corporate control and monitoring, capital mobilising, and providing a transmission path for monetary policy. Then we present the most important theoretical literature that directly models the role of financial markets in economic development. Considering the debate in financial literature which hinges on the assumption that debt and equity finance are substitutes for each other, this chapter concludes with a discussion of the importance of stock markets *vis-à-vis* banks for developing countries.

4.1 Economic Growth Theory: An Overview

Economic growth theory addressees an issue which is of fundamental importance to human welfare: the determination of living standards. Economic growth, defined throughout this study as growth in real per capita gross domestic product (GDP), is obviously not the sole determinant of economic development. Other elements such as the distribution of income, the availability of health care and access to education, are also important factors. Economic growth, however, is a critical condition. Indeed, a continued increase in the average standard of living of the population of any country can only occur as the result of sustained economic growth.

The formal study of economic growth and the public policies necessary to encourage a sustained increase in output began over three hundred years ago by Sir William Petty[2]. However, it was not until John Stuart Mill, the most prominent of the early growth economists, that any analytical framework was applied to the growth process. The organising

[2] Sir William Petty (1676), measured, compared, and discussed changes in the standards of living in France and England . Cited in Eltis (2000).

theme of his " *Principles of Political Economy*" (1848) was a production function based on land, labour, capital, and the productivity of these inputs[3].

By the early 1960s, neo-classical growth theory was the generally accepted approach to modelling growth. Based on the work of Solow (1956), Swan (1956), and Cass (1965), this kind of framework assumes a neo-classical production function with a constant return to scale, diminishing returns to each input (labour and capital) as well as a smooth elasticity of substitution between the inputs.

The neo-classical growth model is thus a fairly simple general equilibrium model that emphasises the process that leads an economy to its steady-state crucial role in ensuring convergence to such a steady-state but also implies that, in the steady state, the productivity of capital is zero, the capital labour ratio is fixed, and that hence growth-generated endogenous factors (*i.e.,* capital accumulation) are zero. In this model, the steady-state rate can be positive if some exogenous force (usually technological progress) is acting on the system- hence the expression "*exogenous growth model*". Since this model assumes that the rate of technological change is given exogenously, it does not provide a useful framework for understanding economic forces and policies, such as the financial factors effect. In this model financial factors, at most, can influence only the equilibrium level of capital stock per worker, but not the rate of economic growth.

In the mid-1980s, a new wave of research on economic growth appeared. This wave led to the development of what has been called "*endogenous growth theory*", which sought to generate alternative ways of modelling the determination of long-term growth rates by focusing on economic growth as an endogenous outcome of an economic system. New endogenous growth theory began with the works of Romer (1986), Lucas (1988) and Rebelo (1991) who developed models characterised by non-decreasing returns to a broad class of capital goods (including human capital). This type of framework built on earlier work by Arrow (1962), who constructed a growth model without the tendency for capital accumulation to generate diminishing returns by introducing knowledge spillover across producers. Romer's (1986) main contribution was to integrate these types of spillover into a competitive framework.

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[3] For more information about the history of economic growth theories see for example Eltis (2000).

What Follows is an attempt to illustrate the chief contribution of the endogenous growth theory vis-à-vis neo-classical growth theory.

Consider the following production function, which for simplicity, depends only on the capital stock

$$Y_t = f(K_t) \tag{4.1}$$

where Y_t and K_t denote the output and stock of capital at time t, respectively. By totally differentiating equation (4.1), we have:

$$G_y = \frac{dk_t}{y_t} f(K_t) = s_t \varphi_t \tag{4.2}$$

where G_y is the growth rate of output, s is the savings rate, and φ is the marginal productivity of capital.

In the traditional literature on growth, emphasis has been placed on the dynamic process that would lead the economy to a steady-state equilibrium in which per capita real output growth would eventually stop. The assumption of the decreasing marginal productivity of capital plays a crucial role in ensuring convergence to such a steady-state equilibrium. In the context of equation (4.2), decreasing marginal productivity of capital, φ, and hence output growth, goes to zero as capital stock, K, grows over time.

The new endogenous growth theory, however, considers a different mechanism in which the marginal productivity of capital does not converge to zero as capital grows unboundedly. Thus, it is possible for real per capita output to grow endogenously, even in the absence of exogenous productivity growth. By altering the rate of technological advancement or human capital accumulation, and thereby investment in physical and human capital, respectively, the endogenous growth theory showed that they could influence long-term steady growth. Since there are externalities to human and physical capital in this theory, appropriate policies and choices help private agents internalise these externalities which could accelerate long-term growth. Thus, the overall policy regime of a country, including taxes, financial structures,

market and regulatory regimes, and macroeconomic distortions, could alter savings and investment allocation decisions in ways that alter long-term growth.

The birth of the endogenous growth theory has enabled the development of tractable growth models where the long-term rate can be affected by elements such as technology, government policies and institutional arrangements. This has rekindled interest in the role of financial development in economic growth. There was obviously no way to induce a role for finance in the determination of long-term rate in the neo-classical model; financial factors in the steady state could be related to the level of capital stock per worker or to the level of productivity but not their respective growth rates. Outside of the steady state, financial elements could affect the transitional growth rate but not the long-term growth rate.

Drawing on the developments in endogenous growth theory, a literature has recently emerged that examines the effects of financial development on long-term growth rates. This body of work, reviewed by Levine (1997), Bossone (2000), and Tsuru (2000), emphasises how functions exercised by financial intermediaries, such as mobilising capital, helping to allocate resources, monitoring managers, and facilitating risk management, can affect economic growth.

4.3 The Functions of Stock Markets

The role and impact of stock markets on the economic development process have not received as much attention as other elements of the financial sector. Historically, the economists have focused on banks. Schumpeter (1912)[4] and more recently Patrick (1966) argue that the services provided by the banking system are essential for technological innovation and economic growth. Goldsmith (1969) and McKinnon (1973) and others provide conceptual descriptions of how the financial system affects economic growth. Recent theoretical models have documented the links between banks and economic activity. By economising on the costs of acquiring and processing information about firms and managers, banks can influence resources allocation. Better banks are lower cost producers of information with consequent

[4] This reference is from Levine *et al.*, (2000).

ramifications for capital allocation and productivity growth (Diamond, 1984; Greenwood and Jovanovic, 1990; King and Levine, 1993a,b; and Arnold and Walz, 2000).

In the last decade the availability of more appropriate data has increased the number of empirical researches in this field. Ghani (1992), King and Levine (1993a,b), Degregorio and Giudotti (1995), Demirguc-Kunt and Maksimovic (1998), Rousseau and Wachtel (1998), Beck *et al.,* (1999b), Levine *et al.,* (2000), Levine (2000), and others show that measures of banking development are strongly correlated with economic growth in a broad cross-section of countries. According to this view of researchers, a well-functioning financial system is critical for sustained economic growth.

Besides the historical focus on banks, during the last decade a growing theoretical literature suggests that well-functioning stock markets can play an important role in the economic development process by performing the following financial functions: facilitating liquidity, diversification risk, aggregating and disseminating information about firms, promoting corporate control and monitoring and transmitting a path for monetary policy. By altering the quality of these functions, a well-functioning stock market can affect a steady state of growth by altering the rate of savings rate, technological innovation, and economic efficiency.

Debate exists, however, over the signs of the effects of stock markets on economic growth: many theoretical studies suggest that stock market development slows economic growth. With regard to this debate on the relationships between stock market development and economic growth the follows a detailed discussion of the stock market functions mentioned above, and how these functions affect economic growth. It is worth noting here that this does not mean that any stock market provides these functions in isolation. As a matter of fact, a well-functioning stock market provides the aggregate of these individual functions. Any theory of stock markets, therefore, will need to synthesise these functions into a single coherent whole while understanding the link between stock market development and economic growth. The following pages will show that none of these studies provided a comprehensive framework for the different functions provided by stock markets.

4.3.1 Liquidity

One way stock markets may affect economic activity is through their liquidity. Liquidity refers to the ease and speed with which agents can convert assets into purchasing power without large price changes between trades (Economides and Siow, 1988). In other words, it is the ability to perform a transaction without cost. Thus, real estate is typically less liquid than equities, and equities in advanced stock markets, such as the UK, Japan, and the US are typically more liquid than equities traded on most of the emerging stock markets. Liquid stock markets are those where it is relatively inexpensive to trade equities and where there is little uncertainty about the timing and settlement of these trades (Levine, 1997).

The link between liquidity and economic growth arises because many high-return projects require a long-term commitment of capital. Savers, however, do not like to relinquish control of their savings for long periods. Thus without a liquid stock market, or other financial institutions that promote liquidity for long-term investment, less investment is likely to occur in high-return projects. Enhanced liquidity, therefore, facilitates investment in long-term, more highly productive projects that boost economic growth.

The role of stock markets as a supplier of liquidity in the economy has been recognised in much theoretical literature. Diamond and Dybvig (1983), Bencivenga and Smith (1991), Levine (1991), Bencivenga *et al.*, (1995, 1996), Diamond (1996), and Fulghieri and Rovelli (1998) and others show that a stock market may arise to provide liquidity to an economy directly; savers have liquid assets *i.e.* equities, while firms have permanent use of the capital raised by issuing equities. In particular, savers receiving shocks can sell their equity claims on the profits of the illiquid production technology to others. Market participants do not verify whether agents received the shock or not, participants simply trade in an impersonal stock exchange. Thus, with liquid stock markets equity holders can readily sell their shares, while firms have permanent access to the capital invested by the initial investors. By facilitating trade, stock markets reduce liquidity risk. As stock market transaction costs fall, more investment occurs in the illiquid, high-return projects. If illiquid projects enjoy sufficiently large externalities, the greater stock market liquidity induces faster growth. In other words, with a liquid stock market, the initial investors do not lose access to their savings for the

duration of the investment project because they can quickly, cheaply and confidently sell their shares in the firm. Thus, more liquid stock markets ease investment in long-term, potentially more productive projects, thereby improving capital productivity and enhancing prospects for long-term growth.

Furthermore, greater liquidity of stock markets has an indirect impact on the monitoring of management. With more liquidity, the market becomes more efficient in that it better reflects information about a firm (Holmstrom and Tirol, 1993). This makes the firm's stock price more informative and hence more useful in monitoring management. More liquidity also makes it easier for an investor to accumulate positions in a stock and to sell these positions as well. There is an argument that in a liquid market, shareholders who do not agree with management policies can sell their shares rather than try to force management to adopt different policies (Bhide, 1993). Another argument states that liquidity is essential for large shareholders to build positions (Maung, 1998). Hence, with liquid markets, investors who want the firm to change its policies or who want to acquire the firm will succed.

A liquid stock market can also influence economic growth through the rate of technological innovation. For example, different production technologies may have a wide array of gestation periods for converting current output into future capital, where long-term technologies enjoy a greater return. Investors, however, may be reluctant to give up control of their savings for very long periods. As the presence of a liquid stock market reduces the cost of exchange ownership claims, then long-term production technologies will be more attractive. Thus greater liquidity will induce a shift to long-term, higher-return technologies (Fulghieri and Rovelli, 1998). Bencivenga *et al.,* (1996) argue that without liquid markets, savers would have been less willing to invest in the large, long-term projects that characterised the industrial revolution "*the industrial revolution therefore had to wait for the financial revolution before it occurred*" (p.2). Boyd and Smith (1998) point out that, "*the absence of equity markets would prevent society from employing its most productive capital technologies. If this were to occur, it is to be imagined that there would be large associated welfare losses*" (p557).

Theory, however, is unclear about the effect of enhanced liquidity on savings rates. Tullio and Pagano (1994) show that greater liquidity reduces uncertainty, and this in turn may reduce

savings rates to the extent that economic growth decelerates. Further, Bencivenga *et al.*, (1995) argue that greater liquidity may induce a reallocation of investment out of initiating new capital investments and into purchasing claims on ongoing projects. This, in turn, may lower the rate of real investment enough to decelerate growth. Demirgue-Kunt and Levine (1996b) point out that increased liquidity can hinder growth through three channels. First, by increasing the return on investment, greater stock market liquidity may reduce savings rates through the income and substitution effect. If savings rates fall enough and if there is an externality attached to capital accumulation, greater stock market liquidity may slow economic growth. Second, by reducing the uncertainty associated with investment, greater stock market liquidity may reduce savings rates because of the ambiguous effects of uncertainty on savings. Third, stock market liquidity may adversely affect corporate governance, very liquid markets may encourage investor "*myopia*" [5]. According to this view stock market liquidity may actually prevent economic growth. However, Bencivenga and Smith (1991) emphasise in their model that growth increases even when aggregate savings are reduced as a result of the greater liquidity of stock markets, the reasons being the dominant effect that the stock market has on the efficiency of investment.

4.3.2 Risk Diversification

While savers generally do not prefer risk, high return projects tend to be riskier than low return projects. Stock markets may mitigate the risks associated with investment. They provide vehicles for trading, pooling, and diversifying risk. Diamond (1967) argues that stock markets allow efficient risk sharing. By providing risk diversification, stock markets can affect long-term economic growth by altering resources allocation and savings rates. Levine (1991) demonstrated that stock markets could accelerate economic growth by reducing two types of risk, liquidity risk and productivity risk[6]. Productivity risk lowers welfare and discourages risk-adverse investors from investing in firms. Stock markets allow investors to invest in a

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[5] More liquid markets make it easy for dissatisfied investors to sell quickly. Liquid markets may weaken the investor's commitment and reduce the investor's incentives to exert corporate control by overseeing managers and monitoring firm performance and potential.

[6] Productivity risk arises because firms are subject to productivity supply shocks during a certain period of production *e.g,* the oil shocks of the 1970s. On the other hand, liquidity risk is the risk of being unable to sell financial assets except at a discount from their face value.

large number of firms and diversify away from idiosyncratic productivity shocks. Well-developed stock markets could, thus, allow investors in multiple firms, both local and foreign and reduce exposure to any one sector. This raises the fraction of resources allocated to firms and accelerates economic growth. Mauro (1995), however, shows that stock markets, by allowing portfolio diversification, may be reducing precautionary savings, thereby tending to lower economic growth.

Stock markets also, by providing risk diversification services, can affect technological innovations and accelerate economic growth. Engaging in innovation is risky, however, the ability to hold a diversified portfolio of innovative projects reduces risk and promotes investment in innovative activities. King and Levine (1993b) argue that risk diversification made possible by stock markets positively aids innovation and thereby accelerates economic growth. They argue that holding a diversified portfolio of new technological products reduces risk and leads to greater investment in new technology than would otherwise be the case. Saint-Paul (1992) relates growth to portfolio diversification via the stock market. He shows that firms can increase their productivity by specialising, but this increases the risk from sector demand shocks. When no stock markets exist, these shocks can be diversified through "*technological flexibility*" which means choosing less specialised, and, therefore, less productive technologies. The development of a stock market enables agents to reduce such risk through diversification of their investments, while at the same time choosing more productive and specialised technology, and, in turn, this productivity gains accelerated growth.

Moreover, Saint-Paul (1992), Devereux and Smith (1994), Obstfeld (1995), Stulz (1997,1999), and Bracker *et al.,* (1999) and others show that stock markets provide a vehicle for the diversification of risk through internationally integrated stock markets and greater risk diversification can influence growth by shifting investment into higher productive projects. Consequently, since high-expected return projects also tend to be comparatively risky, greater risk will foster investment in higher return projects and allow countries to specialise. Bekaert (1995), Bekaert and Harvey (1995a,b; 1998; 2000), Kim and Singal (2000), and Bekaert *et al.,* (2000a,b) argue that higher degrees of market segmentation will increase the level of risk. This situation will strongly affect the local cost of equity, which may have implications for growth.

Integration can decrease risk for the world stock markets as a whole, and hence reduce the country's cost of capital by making diversifiable risks that would not otherwise be diversifiable[7].

Furthermore, Stulz (1997, 1999) details some of the distortions that occur in the segmented market. In the segmented market, local investors are unable to diversify their equity portfolios because they can only invest in local equities, which consist only a small number of equities (as in most of the emerging markets). Since investors will pay a premium for diversification, new local firms will arise that inefficiently operate in industries that provide diversification. Current firms may also diversify away from their core activities by accepting negative "*Net Present Value*" projects that make them more attractive to investors. In this situation we can see that segmentation leads directly to an inefficient allocation of capital, which in turn negatively affects economic growth[8].

In the integrated stock market, these inefficiencies should be reversed. With integration, investors will no longer be interested in investing in inefficient domestic firms when they have opportunities to invest in foreign stock that is efficient. If economic liberalisation occurs at the same time[9], inefficient firms will be driven out of business because their products will no longer be able to compete with foreign products in terms of quality and price. Similarly, local producers may reallocate capital from the inefficient conglomerate divisions in the divisions that have a comparative advantage (Bekaert and Harvey, 1998). While the better-functioning, more integrated stock markets imply greater risk sharing, a reduction in uncertainty, in turn, can reduce the need for precautionary saving, reduce the savings rate, and thereby retard economic growth (Devereux and Smith, 1994). As a result, the theory is ambiguous about the ultimate effect on savings rates of greater risk sharing through international integrated stock markets.

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[7] International assets pricing models show how a shift from market segmentation towards integration reduces the systematic risk of a stock, lowering the required rate of return and increasing the price of the stock, and therefore reducing the cost of equity capital. In completely segmented markets, the expected return of the local market is determined by the variance of the return in that market times the price of that variance. In integrated markets, the expected return of the local market is determined by the covariance of the return in that market with the world market portfolio times the time of that covariance risk (see for example, Errunza and Losq, 1985).

[8] For more a detailed see for example Shing and Stulz, 1998; Faver *et al.,* 1998; and Bekaert, *et al.*, (2000a,b).

[9] Tamirisa (1999) and Svaleryd and Vlachos (2000) argue that economic liberalisation occurs simultaneously with international financial liberalisation.

Furthermore, recent theoretical research suggests that stock markets, by reducing risk, can facilitate a liberal trade policy and thereby economic growth. For example, Freeny and Hillman (1998) provide a theory of trade policy as income insurance. Specifically, they model a two-sector economy with perfectly negatively correlated productivity shocks, which determine which sector will be competitive in terms of exports and import. In the standard case with no financial markets *i.e.* where no portfolio diversification is possible, they argue that the competitive import sector can choose to lobby for protection and policy makers will respond by implementing a tariff. This tariff increases the price for competitive imported goods but also induces a consumption distortion in the economy, thereby lowering economic growth. In the case when the financial markets work, they argue that the special interest groups have no incentive to lobby for protection and free trade will prevail because they will optimally hold a fully diversified portfolio in the domestic and international financial markets. Thus, Freeny and Hillman argue that financial development should precede trade liberalisation[10].

Finally, Hargis (2000) provides a theoretical model that shows how international cross-listings can transform a segmented local equity market from equilibrium of low liquidity and market capitalisation to an integrated market with high liquidity and market capitalisation by altering the incentives of companies and individuals to participate in the market. He argues that integrating stock markets through international cross-listing can increase the revenue received by entrepreneurs going public by increasing the number of investors who are able to diversify away a larger portion of the company's risk, and increase the number of market participants who buy and trade equity, improving liquidity. These factors can stimulate market development and encourage entry to more companies and investors, reduce firms' costs of raising capital and thereby facilitate economic growth[11].

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[10] Svaleryd and Vlachos (2000) provide empirical support for this view using data from 80 countries during 1960-94. They found that there is a strong positive relationship between openness to trade and domestic stock market development. In addition, they found that the degree of integration in international financial markets has a positive effect on openness to trade.

[11] Many recent empirical studies show that listing shares abroad reduces firm's cost of raising capital by diversifying its exposure to different market risks, by reducing illiquidity of trading in its shares and by eliminating investment barriers due to international differences in accounting practices, disclosure requirements and taxation laws. For a full survey of these studies see Karolyi (1998).

4.3.3 Information production

There are various reasons why resources may not be allocated to their highest value of optimal use. The primary reasons are that it is difficult and costly to evaluate firms. Individual savers have neither capacity time, nor the means to acquire information about projects with the highest returns, but at the same time they are reluctant to invest in projects when there is little reliable information. Consequently, higher information costs may cause savers to forego higher return opportunities.

The presence of stock markets may influence the acquisition and dissemination of information about firms (Grossman, 1976,1980; Kyle, 1984; Holmstrom and Tirole, 1993; and Subrahmanyam and Titman, 1999). Stock markets provide incentives to gather information, which is reflected in stock prices. These prices in stock markets direct capital to its best use (the "*prospective*" role of stock prices), and provide managers with feedback about how investors evaluate their performance (the "*retrospective*" role) (Dow and Gorton, 1997). Greenwood and Jovanovic (1990) argue that stock markets promote the acquisition and dissemination of information, thus allowing for better resource and risk allocation. Kyle (1984) shows that larger, more liquid stock markets can encourage investors to acquire more information about firms which would improve resource allocation. Further, Demirguc-Kunt and Maksimovic (1998) argue that well-developed stock markets serve as direct sources of capital and as mechanisms for ensuring that investors have access to information about firms' activities. They show that the existence of developed and active stock markets should make it easier for firms to raise long-term capital.

Stock markets aggregate and disseminate information through a pricing process. Even investors that do not undertake the costly process of evaluating firms, managers and market conditions can observe stock prices that reflect all the relevant and available information (efficient prices) obtained by others. Stiglitz (1985) argues that stock markets quickly reveal information through publicly posted prices, but that this quick public revelation creates a free-rider problem; it reduces the incentive for investors to expend lots of resources in obtaining information about firms because investors can get this information by observing prices. Capiro and Demirguc-Kunt (1997) show that prices quoted on the stock market at least partially

reveal information that more informed investors possess[12]. These prices provide key price signals to managers regarding corporate investment decisions (Grossman, 1978; Grossman and Stiglitz, 1980; Diamond and Verrecchia, 1982; Morcket *et al.*, 2000; and Pagano and Zingales, 2000). Tobin (1982) argues that the most important consequence of stock prices that reflect new firm-specific information is that they allow for improved microeconomic capital allocation. He refers to this linkage as the "*functional*" form of an efficient market. Thus, if this were the case then any pricing inefficiencies would send misleading signals to managers and would distort investment decisions[13]. Holmstrom and Tirole (1993) and Subrahmanyam and Titman (1999) present models in which information produced by the stock market improves allocational efficiency through guiding managerial decisions[14]. Based on the above arguments, stock market efficiency appears to play an important role in the contribution of stock markets to country's economic growth.

Stock prices affect resources allocation and economic efficiency within the firm in a number of ways. A firm which desires capital first, can raise it through an initial public offering. There is direct allocation efficiency here in that: If investors believe that the capital can be more efficiently deployed elsewhere, or if the expected returns on the project are insufficient to induce enough saving, then the price will be low and the project may not be undertaken, and also the offering will fail because the market ascribes a value to the firm that is below its start-up cost (Coonely and Kalay, 1993).

After firms go public, their equities trade on the stock exchange. As long as the stock is publicly quoted, investors have an incentive to value it and gather information on it since there is a profit potential in this activity. The stock price, therefore, provides an average valuation of the firm by investors. Should the firm be unable to finance all its investment needs through

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[12] Dow and Gorton (1997) show that the same information could be produced in a bank economy in which, instead of information traders, bank officers carry out investment appraisal and monitoring.

[13] Some empirical evidence of the linkage between share prices and investment confirms this argument (see for example, Fishcher and Merton, 1984; and Anderson and Subbaraman, 1996). In recent studies, Durnev *et al.*, (20001) provide empirical evidence to show that firm-specific stock price variation reflects the capitalisation of the firm-specific information into stock prices, and increased firm-specific information capitalisation intensity is linked to real investment decisions through at least one channel. More firm-specific information in stock prices can alleviate underinvestment problems associated with accessing external funds, and thereby lower the cost of external capital.

[14] See also Fishman and Hagerty (1989) and Bernhardt, *et al.*, (1995).

retained earnings it will need external finance. The stock market valuation of the firm will be important here since only those firms whose value is greater than their expenses will be allocated funds. Again the market demonstrates allocation efficiency. Firms that are highly leveraged and pay out high dividends will need to keep going back to the market to raise funds and again the stock price will be an important determinant of the amount of capital allocated to the firm (Allen, 1993).

Furthermore, Ehrlich, *et al.,* (1994) provide a framework which suggests that stock markets provide useful business information which is essential in generating entrepreneurs' human capital or firms' specific knowledge that contributes to the productivity growth. They show that, to get the best returns in the markets, individual or institution investors make the effort to acquire information about listed firms on a daily basis. They trade on the information, and the aggregate information is revealed in the markets. Once the market information is created, it then becomes publicly available. This market information is very important for entrepreneurs in augmenting their understanding of the market's environment. It provides knowledge about how investors evaluate both their and their competitors' current decisions, future plans and managerial performance. It enhances entrepreneurs' knowledge about the operation of efficient firms and their ability to develop more efficient production methods. The information reveals the general belief in the current and future prospects of the economy as a whole. Entrepreneurs learn from the information created in the stock markets and implement it at the firm level which becomes entrepreneurs' human capital or firms' specific knowledge. The accumulation of firms' specific knowledge contributes to productivity growth.

4.3.4 Monitoring Managers and Exerting Corporate Control

It is widely believed that stock markets are more efficient at monitoring managers and exerting corporate control than individual investors are. Stock markets can exert control over managers through two mechanisms: the voting and takeover mechanisms. The ability of individual shareholders to influence managers by their vote, however, depends on the ownership structure. If share ownership is widely dispersed, the influence that each owner can exert on management will be small (Stulz, 2000). Moreover, if a shareholder knows that his own voting behaviour will not significantly affect the voting outcome, he will have little incentive to bear

the cost of detecting poor management (Pound, 1988). However, it is argued that even small shareholders, by acting together, can influence managers. One way would be through proxy voting; minority dissident stockholders could obtain from other voting shareholders the authority to act as designated voting representatives at the shareholders' meeting.

The threat of takeovers provides a second mechanism whereby stock markets can exert control over managers, since sales by dissatisfied shareholders can drive down the share price, thereby allowing others to purchase the firm, fire the management, change the policies and reap the resulting capital gain. If the takeover is effective, the market value of a firm should not considerably diverge from its fundamental value, since, if it did, the management would immediately change its strategy or another company would take it over.

Many studies have mentioned the role of the stock markets in exerting control over managers. Knight (1998) argues that a well-functioning stock market can discipline weak management by depressing the value of the equity of their firms, thereby rendering them more likely targets for acquisitions and mergers. If market discipline can be made to work this way, weak management is forced either to improve performance or exit the market before their firm becomes insolvent. Diamond and Verracchia (1982), Stein (1988) and Jensen and Murphy (1990) show that trading shares in a stock market that efficiently reflects information about firms (efficient stock market) helps mitigate the principle-agent problem. The principle-agent problem often arises because managers gain from decisions affecting their firm's value only to the extent of the shares they hold. Suppose a manager holds very little of the firm's equity and his compensation (either flat or tied to the firm's earnings) produces most of his income. This manager has an incentive to take actions that maximise his compensation in ways that might have little or nothing to do with maximising the firm's value (and equity value). For example, many methods of manipulating earnings can lead to higher compensation. Since the manager's equity ownership is small, he may have an incentive to take "*imprudent actions*".

One possibility for mitigating the principle-agent problem is compensating managers with binding contracts that are contingent on long-term performance (Yanagawa, 2000)[15]. Such contracts require a good measure of the long-term value of the firm. For example, current profit is not a good measure for this purpose because it can be manipulated and it reflects short-term considerations. Clearly such a measure should be unbiased, free from manipulation by the management or outsiders. The latter argument suggests an important use of efficient stock markets. Thus, the stock market price in an efficient market gives a good measure of the firm's performance and its long-term value (Durnev *et al.,* 2001). Tying the manager's compensation to the stock prices reduces the incentive for imprudent actions and therefore increases the firm's value [16]. Dow and Gorton (1997) write that, "*because of the agency problem, the managers will not necessarily extract information from stock prices; they must be given appropriate incentives to make good investment decisions. These incentives are linked to the stock market because stock prices can be used to evaluate previous management decisions. Stock prices can then improve investment decisions by allowing more accurate monitoring of the quality of past managerial investment policy*" (p.1089). Thus, an efficient stock market can enhance economic growth by mitigating the principle-agent problem and consequently increasing a firm's economic efficiency.

Bolton and Thadden (1998) show that an active stock market facilitates takeovers as a means to acquire control by reducing free riding. Similarly, if takeovers are easier in well-developed stock markets and if managers of under-performing firms are fired following a takeover, then the stock market can promote better corporate control by easing takeovers of poorly managed firms. Thus, well-functioning stock markets that ease corporate takeovers can promote economic efficiency and thereby accelerate growth (Stulz, 2000).

However, there are disagreements in the theoretical literature about the importance of stock markets in corporate control. Kahn and Winton (1998) argue that well-functioning stock markets can undermine effective control by a large shareholder by giving him excessive

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[15] Another possibility is debt. Debt holding decreases incentives for imprudent actions in two ways: it increases the fraction of equity ownership held by managers, and it increases the probability of bankruptcy after imprudent actions.

[16] For more detailed discussion of this argument see for example Stulz (2000).

incentives to speculate rather than monitor. With regard to this argument, Stulz (2000) points out that, "*making the stock market less liquid could make large shareholders more active, because in a more liquid market, if they feel that the firm is poorly managed, they might just sell their shares*" (p.25). Bhide (1993) and Subrahmanyam and Titman (1999) argue that well-developed equity markets encourage more dispersed ownership and this dispersion impedes effective corporate control[17].

Furthermore, Stiglitz (1985) shows that "*asymmetric information*"[18] may reduce the efficiency of corporate takeovers as a mechanism for exerting corporate control, and stock market development, therefore, will not significantly improve corporate control. Moreover, Stiglitz gives three additional reasons why takeovers are not an effective control mechanism. First, if a realising firm disburses lots of resources to obtain information, other firms will observe the results of this research when the realising firm bids for shares. This will cause others to bid for shares, so that the share price rises. The discovery firm that expended resources obtaining information, therefore, pays a higher price than it would have to pay if "*free-riding*" firms could observe its bid. Thus, the rapid public dissemination of costly information will provide incentives for obtaining information and making effective takeover bids. Second, there is "*a public good*" nature to takeovers that makes takeover mechanisms ineffective. If the takeover is successful, and if as a result the market value of a share is increased, then those shareholders who have not sold out get a free ride, this creates an incentive for existing shareholders not to sell if they think the value of the firm will increase following the takeover. Thus, value-increasing takeovers may fail because the realising firm will have to pay a high price, which will reduce the incentives for the discovering firm hoping to take them over. Third, current

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[17] Shleifer and Vishny (1986) argue that takeovers that might not be possible in the absence of large shareholders might be possible in their presence.

[18] Asymmetric information may arise from the fact that in corporations quoted on the stock markets the managers and the shareholders do not have access to the same or symmetric information. Managers clearly know a great deal more about the operations and the future prospects of their corporations than do the shareholders; if the corporation is not doing well, the managers have an incentive to conceal this information from the shareholders. In principle, the managers are supposed to be the agents of the firm's shareholders. However, since the objectives of the two groups may differ, in corporations where there is separation of ownership from control there exists a "*moral hazard*" that the managers may pursue policies which promote their own ends at the expense of those of the shareholders. This also leads to the "*principal-agent*" problem (Singh, 1992a).

managers are often in a position to take strategic actions that deter takeovers and maintain their positions.

Moreover, Shleifer and Vishry (1986) argue that well-developed stock markets that facilitate takeovers may abuse resources allocation. Existing implicit contracts between former managers and stakeholders in the firms do not restrict new owners and managers to the same extent that they bound the original managers. Thus, a takeover allows new owners and managers to break implicit agreements and transfers wealth from firm stakeholders to themselves. While new owners may profit, there may be deterioration in the efficiency of resources allocation. Further, another important cost arising from takeover activities in stock markets is that a takeover induces management to concentrate on providing short-term profits and financial returns to the shareholders (Stulz, 2000). This policy jeopardises corporations' attempts to make the investment needed for their long-term success, and, as a result, adversely affects their efficiency and competitiveness.

4.3.5 Mobilising Capital Resources

Stock markets and other financial institutions play a key role in mobilising capital resources to their efficient use (Stulz, 2000; and Wargler, 2000). Stock markets aggregate the small savings of numerous investors for use by agents with entrepreneurial and managerial talents who need funds for large-scale capital investment. Stock markets can ease capital mobilisation and allocation to more efficient uses by providing investors as well as entrepreneurs with liquidity and risk pooling facilities. Levine (1997) points out that, "*Mobilising-pooling involves the agglomeration of savings from disparate sources for investment. Without access to multiple investors, many production processes would be constrained to economically inefficient of scales. Furthermore, mobilisation results in the creation of small denomination instruments. These instruments provide opportunities for households to hold diversified portfolios, invest in efficient firms, and to increase asset liquidity*" (p.698-99). Sirri and Tufano (1995) argue that by enhancing risk diversification, liquidity, and the size of feasible firms, mobilising improves resources allocation. In addition, we argue here that the main impact of capital mobilisation is one of promoting technological innovations. Through easing the burden of risk to capital

contributors as well as to the entrepreneurs, markets and institutions enable the undertaking of risky technological innovations.

The intimate relationship between the mobilising function of financial markets and technological choices was first emphasised by Hicks (1969) in his quest to explain the genesis of the industrial revolution. He argues that an essential feature of industrial development is the adoption of technologies that require large-scale illiquid capital investments. Financial markets and institutions that provide risk-sharing possibilities make it economically feasible to implement such technologies. For Hicks, the industrial revolution was not associated with the discovery of any particular new technology. He argues that most of the technological innovations had been made before the onset of the industrial revolution. However, their adoption and full implementation on an economical scale required the commitment of large-scale investments for a long period in an illiquid capital form. Financial markets and institutions that provided investors with liquidity made such technologies feasible. He points out that, "*In order that people should be willing to sink large amounts of capital, it is the availability of liquid funds which is crucial*". Thus the choice of production technologies is intimately linked to the capital mobilisation role of financial markets.

In more recent studies Bencivenga *et al.,* (1995) and Hermes and Lensink (1999) argue that by economising the transaction and information costs that are associated with multiple bilateral, financial markets can ease capital mobilisation and thereby enhance capital accumulation and resources allocation, which in turn has a positive effect on economic growth. Bencivenga and Smith (1991) and Greenwood and Smith (1996) show that large, liquid, and efficient stock markets can ease capital mobilising. By agglomerating savings, stock markets enlarge the set of feasible investment projects. Since some worthy projects require large capital injections and some enjoy economies of scale, a stock market that eases capital mobilising can profoundly affect economic growth.

4.3.6 Transmission Path for Monetary Policy

Understanding how monetary policy affects economic activities remains one of the greatest challenges of academics. There are two possible paths, or channels, through which monetary

policy flows to affect the economy: the "*money*" channel, and the "*credit*" channel[19]. These paths, however, have one similarity- they must be paths through some financial market. An important financial market that has been overlooked as a channel for monetary transmission mechanisms is the stock market.

Recently, Boyle and Peterson (1995), Malliaropulos (1996) and Chami *et al.,* (1999) have argued that, besides the traditional channels, the stock market is an important path through which monetary policy affects economic activity. They show that stock markets can provide this mechanism through the effect of inflation on household equity holding. Monetary policy is a key determinant of the rate of inflation. Stockholders respond to actual inflation, expected inflation, and monetary policy actions by changing the rate of return they expect from their stockholdings[20]. The managers of firms, in turn, are charged with creating value for the shareholders of the firm. They react to changes in the stock price of their stockholders by changing the conditions of production. Thus, by affecting the rate of inflation, a change in monetary policy will alter stockholders' required rate of return. As required rates of return change, the stock price fluctuates. Managers respond to changing stock prices by changing their investment and production plans, in turn affecting capital productivity in the economy and thereby affecting economic growth. Therefore, this channel suggests that price level is the appropriate target of monetary policy.

Another example of how economic growth can respond to monetary policy through the stock market mechanism is when monetary policy lowers the return to holding money by lowering short-term interest rates, and demand for other assets increases (Cheung and Ng, 1998). Among these assets, the shares issues by firms to finance their investment projects. As the demand for their shares increases (raising the price), firms realise that more of their investment projects have a positive net present value, and they issue more shares in order to

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[19] For more details on these monetary transmission mechanisms see Romer (1993).

[20] In his well-known general equilibrium model for the financial sector, Tobin (1969) emphasised stock returns as an important link between the real and financial sides of the economy. In that model, Tobin demonstrated how stock returns might respond to changes in the monetary variables of the model. Empirically, Mandelker and Tando (1985) find that money growth has a positive impact on real stock returns in six major industrialised countries. Aspern (1989) also, finds that money supply is positively related to stock prices in ten European countries. Sharpu (1999) finds that a one percentage point increase in expected inflation in the US increases required long run real stock returns by about one percent point, and it reduces the current price of stocks by about

finance them. In this way, investment increases and output rises. In this example, the "*special feature*" of the stock markets is that money is an asset that substitutes for shares.

4.3 Some Theoretical Models

As we have shown above, a rich theoretical literature emphasises the role of financial markets, especially stock markets, in spurring economic growth. Among these studies, however, there are eight important studies that have directly modelled the role of financial markets in economic development: Greenwood and Jovanovic (1990), Bencivenga and Smith (1991), Greenwald and Stiglitz (1989), Saint-Paul (1992), Subrahmanyam and Titman (1999), Boyd and Smith (1998), Levine (1991), and King and Levine (1993a). These models link the financial system with the steady-state growth rate of per capita output. Specifically, most of these models extend and link two literatures: the endogenous growth literature, associated with the work of Romer (1986) and Lucas (1988), who construct models in which agents make decisions that fully determine the economy's steady-state growth rate, and the financial structure, associated with the work of Diamond and Dybvig (1983) and Diamond (1984), which construct models in which financial contracts emerge as optimal responses to an economy's informational and risk characteristics. The following paragraphs provide a brief summary of each of these studies.

Greenwood and Jovanovic (1990) emphasise in their model both the informational and risk sharing roles of financial markets in improving capital mobilising to the optimal use and hence in increasing growth. They develop a model with two assets: safe, low-yield technology, and a risky high-yield one, where the return on the latter is affected by an aggregate and a project-specific shock. Financial markets are able to offer agents a higher return than they invested individually because they collect information that enables them to decipher the aggregate productivity shock and they can better diversify project-specific risk due to the large portfolios they hold. Therefore, financial markets allocate capital more efficiently and the resulting higher productivity of capital increases growth. It is worth noting that in this model higher growth stimulates increased participation in financial markets, which leads to the expansion of

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20 percent.

financial institutions. Thus, a two-way causality between financial development and growth emerges in their model.

Bencivenga and Smith (1991) construct a bank that by pooling the economy's resources eliminates liquidity risk and invests more efficiently. In their model, a bank enables individuals to pool liquidity risks and can promote higher growth by shifting the composition of savings towards more capital accumulation and by reducing unnecessary capital liquidation. Banks channel funds from risk-averse savers to entrepreneurs who invest in productive capital and hence provide liquidity to the former group by enabling them to hold bank deposits instead of other liquid and unproductive assets. These funds are then available for investment in capital accumulation and thus reduce the need for the self-financing of investment.

Greenwald and Stiglitz (1989) propose a theoretical model to examine the impact of financial market imperfections on the long-term productivity growth of firms. Their model focuses on failures of firms in selling equity securities, which help firms by diversifying the risk of real investment. Particularly, they argue that failures in stock markets limit the abilities of firms to diversify the risks of their operations and hence lead to a reduction in the level of such operations as an alternative means of risk management. They show that since the curtailment of firms' operations will limit the extent of "on-*the-job training*" and other learning effects, as well as direct investment in productivity improvements, the stock market imperfection will adversely affect the rate of productivity growth.

Saint-Paul (1992) presents a model in which financial markets interact with the technological choice of the firm in that financial markets allow riskier but more productive technologies, and technological choice, in turn, affects the viability of financial markets. Productivity growth is achieved through a greater division of labour that leaves specialised factors of production at greater risk. By enabling agents to hedge against risk through holding diversified portfolios, financial markets permit a division of labour. Thus, the Saint-Paul model emphasises that financial markets contribute to growth by facilitating a greater division of labour which implies specialised (and therefore risky) and productive technology. Without financial markets, technology becomes less specialised, leading, in effect, to diversification through technology.

Subrahmanyam and Titman (1999) emphasise in their model how going-public decisions provide important insights into the development of financial markets and how government actions that can have the effect of "*Jump-starting*" an economy's stock market can improve economic efficiency. They show that because both liquidity and the information generated in a stock market are determined by the number of stock market participants, whether a firm is better off being privately as opposed to publicly financed is also determined by the size of the stock market. When the stock market consists of a relatively small number of firms, the information conveyed in the stock market is less accurate, which decreases the advantage of being publicly financed. As the stock market grows, the information conveyed by stock prices improves, which, in turn, increases the incentive for firms to go public.

Subrahmanyam and Titman show that by going public, firms can generate positive externalities by increasing the size and informational efficiency of the stock market. As a result of these externalities, there can be a path dependency in the development of financial markets, particularly they assume that an economy can have two equilibriums: first, a "*bad*" equilibrium in which most firms remain private; second, a "*good*" equilibrium in which there are superior resources allocation and greater firm values and in which most firms are publicly traded in the stock market. Firms choose not to go public in the bad equilibrium because they ignore the positive externality associated with having additional firms trading on the stock market. They argue that with more publicly traded stocks, it is more attractive for individuals to open brokerage accounts to become stock market investors. When the influence of serendipitous information on production choices is strong, these additional active investors improve the capital allocation process, providing a greater incentive for individuals to become active investors, thus creating a snowballing effect that can move the economy from the bad equilibrium to the good equilibrium.

Boyd and Smith (1998) have developed an endogenous growth model which presents a framework in which capital formulation is financed by issuing debt and equity. They examine an economy in which investments are undertaken by a set of agents who require external financing, and in which their financial decision depends on the amount of information needed by the investor to monitor the management. Boyd and Smith suggest two kinds of technology

available to the investors: one which yields a return which is freely observable only by the initiating investor (debt); the other which yields a return which is publicly observable (equity). They conclude that as an economy moves along a growth path and accumulates capital, the relative price of capital falls, as a result monitoring costs will rise as the economy grows. As a consequence, investors will tend to employ observable capital production technology more intensively as an economy grows. Hence, as the economy grows, there will be an increased volume of equity market activities, and a fall in the debt/equity ratio. Accordingly, Boyd and Smith's analysis suggests that there is a bi-directional relationship between stock market development and economic growth, and the banking sector and stock market, in the long-term, become complementary source of finance.

The most important contribution to the theoretical literature of stock market development and economic growth has been that of Levine (1991). In order to explain the role of financial market development in economic growth, his work constructs an endogenous growth model in which the stock market emerges to allocate risk, and explores how the markets alter investment incentives in ways that change steady-state growth rates. He demonstrates that stock markets accelerate growth by facilitating the ability to trade ownership of firms without disrupting the productive process occurring within firms and by allowing agents to diversify portfolios. In the absence of the stock markets, lenders facing liquidity constraints which would force firms to pay back loans, thus forcing firms to liquidate (fully or partially) those assets which they own. Since such assets include capital assets, which embody a firm's technology, this will lower the firm's productivity. He further explains the effect of tax policies on growth both directly by altering investment incentives and indirectly by changing the incentives underlying financial contracts.

Like Bencivenga and Smith (1991), Levine's model uses the Diamond and Dybvig (1983) structure of preference to create liquidity risk and also to include productivity shocks that create production risk. Liquidity risk and productivity risk create incentives for the formation of stock markets. Productivity risk lowers welfare and discourages agents from investing in firms. The stock market allows investors to invest in a large number of firms and to diversify

away from idiosyncratic productivity shocks. This raises welfare, the fraction of resources invested in firms, and the economy's steady-state growth rate.

In the Levine model the economy consists of an infinite sequence of three period-living agents and a countable infinity of agents are born each period. Population growth is zero. Young agents are identical with the following utility functions:

$$u(c_1, c_2, c_3) = -\frac{[c_2 + \phi c_3]^{-\gamma}}{\gamma} \tag{4.3}$$

where $\gamma>0$, is the coefficient of relative risk aversion, and c is age i consumption. Since young agents do not value age one consumption, all young period income is saved, hence the financial system and policy cannot affect agents' decisions about how much of their income to save. Furthermore, the agent-specific, privately observed random variable φ becomes known at the beginning of the second period of life, and has a probability distribution as following:

$$\varphi = \begin{bmatrix} 0 \text{ with probabilit } y & 1-\pi \\ 1 \text{ with probabilit } y & \pi \end{bmatrix} \tag{4.4}$$

The preference structure implies a "*desire for liquidity*" because agents want to consume their wealth at age two if $\varphi=0$. In the second stage of a firm's production, age three firm members with physical capital hire age one workers and produce goods

$$y_{t+2} = \eta_{t+2}\ \mathrm{K}_{t+2}\ L_{t+2}^{1-\theta} \qquad 0\langle\theta\langle 1, \tag{4.5}$$

where L_{t+2} is age one labour units hired per entrepreneur in t+2 and η_t is a firm specific productivity shock with an expected value of one.

From a maximisation of the agent's problem, Levine derives the following steady-state growth rate:

$$G_y = K\pi^{-\delta}\rho q = K\pi^{-\delta}\rho\frac{\varepsilon\pi}{1-\pi+\varepsilon\pi} \tag{4.6}$$

where G_y is the growth rate, K is the physical capital investment, and q is the stock market development.

In Levine's model, the stock market raises the growth rate by increasing the productivity of firms or by improving the allocation of resources. Stock markets increase firm efficiency, through K, because they eliminate the premature liquidation of firm capital. Instead of the liquidation of capital, agents that receive liquidity shocks sell their shares to agents that value period three consumption. Consequently, more capital is maintained in firms for two periods, which accelerates the rate or physical capital accumulation. Stock markets influence growth also by increasing the fraction of resources allocated to firms. If agents are sufficiently risk averse, the proportion of resources devoted to firms is higher with stock markets. By allowing firms to diversify productivity risk, stock markets encourage risk-averse agents to invest more in firms. In addition, stock markets reduce the liquidity risk associated with firm investment; agents that receive liquidity shocks can sell their shares for more than the liquidation value of the firm price. Finally, by increasing firm efficiency, stock markets raise the return on firm investment. Thus, the emergence of stock markets to manage productivity and liquidity risk accelerates growth by attracting resources to socially productive firms.

King and Levine (1993a) proposed a model in which innovation activities serve as an engine of growth. A higher rate of successful innovations results in a high growth rate of productivity. Financial markets appear in two different forms in the model. The first is where the intermediaries act like venture capital firms. They evaluate, finance and monitor the risky and costly innovations. The second form is like the stock market. The present value of the innovation is revealed in the stock market and selling the equity shares on the market can diversify the risk associated with innovation. Therefore, according to King and Levine, better development of the financial market can improve the possibility of successful innovations: "*Better financial systems improve the probability of successful innovation and thereby accelerate economic growth*" (p.513). They point out that, "*financial institutions play an active role in evaluating, managing, and funding the entrepreneurial activity that leads to productivity growth. Indeed, we believe that our mechanism is the channel by which finance*

must have its dominant effect, due to the central role of productivity growth in development" (p.515).

In conclusion, in the above theoretical studies which link financial markets development with economic growth, three channels are emphasised: the promotion of physical capital accumulation, improved capital mobilising and increased the productivity growth through the facilitation of (risky) **technological advances** and the inducing of real **economic efficiency** with which resources are utilised[21]. Despite their efforts, however, they are still not very successful in providing a comprehensive framework of the different functions of stock markets with empirically testable relationships. As we have shown above, all these studies concentrate on specific aspects of financial markets and their impact on real activity and ignore other functions. Another area of neglect is that so far very few attempt have been made to distinguish the roles played by different financial markets, such as banks, stock markets, bond markets and insurance companies, in the relationship between financial markets and economic growth.

4.4 Debt versus Equity Markets and Economic Development

Recently, much of the existing debate in the financial literature hinges on two central questions. Are debt and equity finance substitutes? And, what stock markets do that banks cannot? While stock markets and banks have existed in most developing countries, their relative importance has varied. The World Bank (1989b, 1994b) has argued strongly the for establishment and promotion of stock markets in developing countries along western developed lines, while economists such as Stiglitz (1989a), Collier and Mayer (1989), Cobham (1995), Singh (1992a, 1996, 1997a, 1999), Fry (1997) and Singh and Weisse (1998) have put the emphasis on banks rather than on stock markets.

It is widely argued that banks are better at providing inter-temporal and intergenerational risk sharing through averaging gains and losses over time and long-term commitment, while stock

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[21] Economic efficiency (X-efficiency or technical efficiency) reflects the degree to which a producer achieves the maximum attainable quantity of output for a given bundle of inputs or alternatively, the degree to which a given level of output is achieved with the minimum attainable level of inputs. And measured as the observed total cost compared to the optimal given the level of output and input prices.

markets provide cross-sectional risk sharing by providing a more diverse set of financial instruments (Allen and Gale, 1995, 1997; and Fulghieri and Rovelli, 1998). As we have shown above, the major function of financial markets is to provide opportunities for risk sharing among different individuals. Stock markets allow them to diversify their portfolio, reduce idiosyncratic risks and adjust the riskness of portfolios according to their ability to bear risk. Thus, under the stock market, different individuals are exchanging risks at a given point in time. This type of risk sharing is termed as "*cross-sectional risk-sharing*". In the real world in which participation and markets are incomplete it is impossible to obtain insurance against all risks. One form of risk sharing that is not provided by stock markets is called "*intergenerational risk sharing*". If one generation wants to sell its holdings of assets, another generation must be willing to buy. However, in stock markets, different generations participate in the market at different points in time and thus participation is incomplete. This difficulty in matching means the price at this exchange becomes very volatile, and this price variation may cause large consumption risks. In this case banks can provide insurance against these variations in asset prices by averaging gains and losses over time (Fulghieri and Rovelli, 1998). Another type of risk-sharing that is not provided by stock markets is "*inter-temporal risk sharing*". An example of this type of risk is external shocks, which can affect the whole economy *e.g.,* oil shocks, financial crises. This type of risk cannot be diversified away by holding a large portfolio with many stocks. According to Allen and Gale (1997), banks can diversify this type of risk by using the accumulation of large reserves of safe assets as a way of building up in good times and drawing down in bad times.

Another advantage of banks over the stock market is that it is better to mitigate agency costs and informational asymmetries, which could lower the cost of capital especially for younger and small firms whose fund-raising is constrained by capital market imperfections (Stulz, 2000). Banks reduce the informational asymmetries and agency costs by building long-term relationships with firms supported by implicit self-enforcement contracts or reputation concerns (Diamond, 1991; Scholtens, 2000). Fama (1985) argues that banks are better at reducing informational asymmetries by collecting information, because bank borrowers are also depositors, and the history of deposit provides inside information on the quality of the borrower. A deposit regularly supplied would indicate that its holder has a stable financial

situation and would be able to reimburse his loan, whereas a volatile deposit would reflect the opposite (Singh, 1992b, 1997b). For competitive reasons also, enterprises may be unwilling to reveal to the general public the information which would be necessary in order to obtain funds from the stock market, but would agree to provide it to their bank.

Banks also facilitate re-negotiation of contracts; this can be beneficial for firms, especially those experiencing problems. But, ex post control on firms is weaker than in the stock market, since banks incurring sunk monitoring costs have an incentive to extend their loans to unprofitable projects, leading to "*soft-budget constraints*" (Dewatripont and Maskin, 1995). Stock markets with no process of long-term monitoring can halt unprofitable projects but make re-negotiation more difficult due to co-ordination failures among many different investors (Bolton and Scharfstein, 1996).

The greatest advantage of banks, however, lies mainly in their monitoring and controlling mechanisms. The importance of the governance role implicitly assumes that financiers know very well how firms should be run. In such cases, a majority view of the firm's opportunities among financiers can be reached easily. According to Diamond (1984) and Arnold and Walz (2000), an intermediary, namely a bank, can play the role of a delegated monitor. However, when firms belong to entirely new industries or their technologies are rapidly changing, there might be a lack of common knowledge about the optimal strategy of these firms. In such cases, the governance functions by banks would be less important and inefficient. The stock market, however, could play this role more efficiently, since stock prices continuously aggregate diverse information obtained by investors. This allows stock prices to reflect the true value of a firm given current management policies and thus provide, as we have mentioned elsewhere, signals for the allocation of resources.

Proponents of the stock markets also emphasise that by acquiring inside information about firms, banks can extract information rents from firms (Hellwing, 1991). The bank's market power reduces the incentives of firms to undertake profitable projects since banks extract a large share of the profits (Rajan, 1992; and Arnold and Walz; 2000)[22]. By encouraging

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[22] Cetorelli and Gamberra (2000), however, find that financially more dependent industries grow faster in economies with more concentrated banking sectors.

competition, stock markets create greater incentives for entrepreneurship than banks. Furthermore, banks tend to be ineffective corporate controllers due to their insider status. If bankers hold equity and vote on the shares of other shareholders, they might collude with managers against other outside investors and thereby thwart competition and hinder effective corporate control (Hellwig, 1998).

We have shown from the above discussion that there is an intensive debate focused on the relative merits of banks as opposed to stock markets[23]. Historically, empirical research on the relative merits of banks versus stock markets in fostering economic performance has centred on advanced countries. For developing countries, much less empirical research has been done. For example, in more recent studies, Mayer (1988) has presented empirical evidence on the overall contributions of internal finance and various forms of external finance to the non-financial corporate sectors of a number of developed countries. He found that the most important source of funds in the UK, Japan, Germany, and France was retained earnings. With stock markets showing up as relatively unimportant, the banks were the most important source of external finance in these countries. However, in the US, much external finance was raised through the bond market. Interestingly, support for this result can be found in the work of Corbett and Jenkinson (1994), when they found that over the period 1970-89, the stock markets made a net negative contribution to the financing of corporate investment in the UK and a small positive one overall in the US.

In the first large scale empirical study of corporate finance for developing countries, Singh and Hamid (1992) have analysed corporation financial structures in nine developing countries over the period 1980-88[24]. Their sample frame is the 50 largest manufacturing firms quoted on the stock markets in each of these countries. Singh and Hamid find that firms in the developing countries use external finance to a far larger extent, and that this is extremely high relative to the experience of developed countries. They also find that the majority of the countries in their sample, the top corporations used much more equity than debt to finance the growth of their

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[23] See Allen and Gale (1999) Boot and Thakor (1997), Rajan and Zingales (1999), Stulz (2000) and Beck and Levine (2000) for discussion and additional references.

[24] The countries studied include the Republic of Korea, Thailand, Malaysia, Pakistan, India, Turkey, Mexico, Jordan, and Zimbabwe.

net assets. Therefore, they conclude that equity finance has been much more important for these firms than for firms in the industrialised countries and much important than previous work on developing countries had suggested[25]. Other economists such as Atkin and Glen (1992) have used this work to press the case for the establishment and promotion of equity markets in developing countries.

More detailed work was undertaken by Singh (1995). In his study, Singh set new data covered the top 100 listed corporations, over a slightly longer time period, 1980-90, and including an extra country (Brazil). Singh's new results confirmed the earlier findings by Singh and Hamid (1992): the mean proportion of internal finance (retained profits after tax as a percentage of the growth of net assets) was 38.8 percent, while issues of equity finance provided 39.3 percent and long-term debt provided 20.8 percent. Singh (1995) has gone to some lengths to reject the suggestion that developing countries are simply repeating the historical experience of the US. He suggests that the essential reasons why developing countries corporations resorted so much to equity financing in the 1980s and in the earlier 1990s were: First, the relative cost of equity capital over the 1980s and the early 1990s fell significantly, which resulted from the large rise in share prices and a rise in real interest rates. The rise in share prices was brought about by both internal and external financial liberalisation and government support for stock markets in these countries. The rise in interest rates was a consequence of both internal financial liberalisation (financial de-repression) and a steep rise in international interest rates. Second, the governments in many developing countries have played a major active and productive role in the expansion of these markets. These activities include financial liberalisation and privatisation, which have significant effect both on the supply of and the demand for securities.

Nigaraj (1996) shows that capital market growth in India led simply to portfolio substitution from bank deposit to tradable securities rather than to a greater national of financial savings. He notes that despite the stock market boom during the 1970s and the substantial resources rose there by Indian corporations, investment in fixed assets declined. Furthermore, Samuel (1996) estimates the role of the stock market as a source of finance for sample data which

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[25] See for example, Fry (1988):" *The 35 security markets that exist in developing countries have generally played*

covered both Indian and US firms. He finds that internal finance plays less of a role for Indian than for US firms –and external debt a bigger role[26]. To the extent that these findings for India are generalisable to other developing countries, Samuel concludes that the development of stock markets is unlikely to spur corporate growth in developing countries.

Furthermore, Singh (1992a, 1996, 1997a, 1999) and Singh and Weisse (1998) argue that the stock market development in developing countries in the 1980s and 1990s is unlikely to help in achieving quicker industrialisation and faster long-term growth in most developing countries. They show that the development of the stock markets in most developing countries has not led to an increase in aggregate savings as a result of greater new-issue activities on the stock markets in these countries, and that in some countries *e.g.* Mexico and Turkey, aggregate savings fell during the 1980s. And these new issues simply represent substitution of one form of saving (government saving or banks saving) for another (purchase of corporate shares in the stock markets). Further, they argue that share prices in emerging markets exhibit much greater volatility than those of advanced countries, this being due to various imperfections and the segmentation of stock markets in these countries[27]. A high degree of volatility has a negative effect on the role of the stock market: it makes share prices much less useful as a guide to the allocation of investment resources, it also discourages risk-averse investors and savers, it raises the cost of capital to corporations and it may also stop risk-averse firms from raising funds or from seeking a listing on the stock market. Moreover, these researchers show that stock markets invariably encourage short-term profits rather than permit corporate managers to take a long-term view of investment, which is in turn most important for developing countries.

Based on the above arguments Singh (1992a, 1996, 1997a, 1999) and Singh and Weisse (1998) argue that stock markets in developing countries do more harm than good and that

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only very minor roles in domestic resource mobilisation" (p. 288).

[26] Samual's (1996) result is consistent with theoretical predictions, given that information and agency problems are less severe for Indian than for U.S. firms. (The Indian financial system is predominantly bank-oriented, more like the German and Japanese Financial systems than like U.S and U.K systems.)

[27] Some researchers also document a similar conclusion (see for example Rouwenhorst, 1999; and Gen *et al.*, 2000). High price volatility in emerging markets may stem from small-market and informational imperfections. With few trades occurring, information about stocks- and therefore stock prices- tends to be noisy. Moreover, limited-reporting requirements in many markets means that investors typically have less information about firms and receive less-frequent updates than do investors in advanced markets.

bank-based financial system is more suitable for the developing countries. Singh (1997a) points out that, "*Stockmarkets are potent symbols of capitalism but paradoxically capitalism often flourishes better without their hegemony. ...Developing countries simply cannot afford the luxury of stockmarkets. As Keynes noted ..., when the capital development of a country becomes the by-product of the activities of a casino, the job is likely to be ill-done*"(p. 780).

Cameron (1997) argues that savers are at a disadvantage in acting directly with entrepreneurs because of the cost of information. He concludes that a bank-based system of finance, although carrying its own risk, is a far better system for developing countries. Further, Cobham (1995) shows that because stock markets in developing countries suffer from problems such as an imperfect flow of information, high transaction costs because they are too small to benefit from the economies of scale that characterise the major stock markets of the world, in the developing countries there must be a strong preference for a bank-based rather than a market-based system. Furthermore, Fry (1997) points out that, "*At best stock markets play a minor role; more often they resemble gambling casinos and many actually impede growth in developing countries*" (p. 754).

Other observers, however, regard stock market development as highly favourable to economic development, on the grounds that stock markets may be better at providing capital for new ventures and financing risky technical innovations, and on the grounds that stock markets may mobilise additional financial resources for investment. Kenny and Moss (1998) have gone to some lengths to reject Singh's suggestion that stock markets will cause such problems as to make them do more harm than good for developing economies, and to develop a justification for their opinion that the focus should be on stock markets rather than on banks in developing countries. They argue that: First, short-termism becomes less necessary with the creation of investment instruments that no longer have to match the preferred liquidation dates of equity holders. As stock can be sold at any time, much of the liquidity risk will be reduced. Second, stock markets can make equity finance increasingly cheaper for firms. Stock markets can do that by encouraging new supplies of capital. This in turn reduces the average cost of capital and new investors entering the market will raise P/E ratios. Finally, companies, by financing their activities through issuing equities, will have the opportunity to take risks much greater

than they could with finance from a bank loan, they will also be more willing to take risks than company owners because that risk has been diversified among many investors. They also argue that because of the need for reserve requirements, moving capital from the informal market to the banking sector crowds credit, and stock markets are free from this problem.

The World Institute for the Development of Economic Research (WIDER) in their report in 1990 pointed out that, "*the need to attract foreign capital in non-debt creating forms is only one reason, and not the most important reason, why developing countries should wish to foster their emerging equity markets. Equity markets are a vital part of economic development-they encourage savings, help channel savings into productive investment and encourage entrepreneurs to improve the efficiency of investment*" (p.6). Allen (1993) uses the "*multiple checking*" provided by stock markets to argue that stock markets might be preferable in situations where optimal managerial decision rules are hard to formulate (for example in industries where technology is constantly changing), whereas banks work well in situations where there is consensus about technology (such as in competitive industries).

Atje and Jovanovic (1993) provide a model in which stock markets have a greater stimulating effect on economic growth than banks. This is because it is assumed that stock markets are more conducive to the development of venture capital and hence technical progress than the banks. Their cross-country empirical analysis suggests that countries that finance their investments more with equities and less with debt tend to grow faster. This leads them to enquire why " *more countries are not developing their stock markets as quickly as they can as a means of speeding up their economic development*" (p. 636).

Furthermore, Cho (1986) argues that credit markets need to be supplemented by a well-functioning equity market. He suggests that this is because "*equity finance is free from adverse selection and moral hazard effects while debt finance is subject to them in the presence of asymmetric information*" (p. 197). He then shows that in order for the lenders (debt finance) to allocate credit to a firm as efficiently as equity investors, they must know one more permanently, and know the riskiness of each individual borrower. Therefore, in a world of imperfect information, the existence of equity markets will enhance the allocative efficiency of capital. He therefore concluded that a substantial development of equity markets

is essential for successful financial liberalisation in developing countries. Fledman and Kumar (1994) argue that the limited availability of debt finance in many developing countries, including bank loans which may be limited to a select group of companies, makes equity finance in these countries more attractive.

Other empirical research, Demirguc-Kunt and Maksimovic (1996, 1999), focuses on the impact of stock market development on firms' financing decisions and the impact of the availability of long-term debt on firms' performance. Analysing firm level debt-equity ratio in 30 developed and developing countries, they find that the existence of active stock markets increased the ability of firms to borrow, especially in countries with developing financial markets. They also show that an active stock market and an improved ability of creditors and debtors to enter into long-term contracts are reflected in the ability of firms to grow at rates greater than they could attain by relying on their internal sources or short-term bank credit. These findings are consistent with the view that improvement in stock market functioning trends to improve liquidity information quality, monitoring, and corporate control, such that these improvements induce creditors to lend more. For these firms, debt and equity finance are complementary[28].

Furthermore, using data from 44 developed and developing countries from 1976 to 1993, Demirguc-Kunt and Levine (1996a) investigate the relationships between stock market development and financial intermediary development. They find that countries with better-developed stock markets also have better-developed financial intermediaries. Thus, they conclude that stock market development goes hand-in-hand with financial intermediary development and stock markets provide important but different financial services from banks. Using pooled data from 15 industrial and developing countries from 1980 to 1995, Gracia and Liu (1999) examine the macroeconomic determinants of stock market development, particularly market capitalisation. In their regressions they includes one measure of financial intermediaries development *i.e.,* domestic credit to the private sector divided by GDP. They find that financial intermediary development measure has a positive and significant effect on stock market capitalisation. They conclude that the stock market is a complement rather than

[28] A fact also noted by Rajan (1992), Rajan and Zingales (1998) and Pagano and Zingales (2000).

substitute for the banking sector and developing financial intermediaries can promote stock market development. Using bank-level data from 80 developed and developing countries over the period from 1990-97, Demirguc-Kunt and Haizinga (2000) investigate if there is any relationship between banks' performance and the level of stock market development. They find that a larger market capitalisation to GDP increases banks profits and interest margins, which reflecting possible complementarities between bank and stock market finance[29]. Therefore they conclude that stock market development may improve bank performance, for instance, as stock markets generate information about firms that is also useful to banks. The legal and regulatory environment that makes stock market development possible may also improve the functioning of banks.

Moreover, in a recent empirical paper, Levine and Zervos (1998a) find that stock market development is robust with economic growth and that a stock market provides different financial services from those provided by banks[30]. Gerad and Demirguc-Kunt (1997) point out that, "*banking system and stock markets development are complementary, most likely because each produces and demands better information*" (p26). In an important empirical study, Levine (2000) argues that financial services provided by banks and markets are both important to the economic development process of a country. Finally, Beck and Levine (2000) provide evidence that industries that are heavy uses of external finance grow faster in countries with a higher overall rate of financial development. They then conclude that banks and markets might act as complements in providing financial services and promoting economic development.

From the above review, it seems that some economists tend to argue that since stock markets do not raise much capital, they are relatively insignificant in the development process. From a casual reading of corporate finance literature, this view is not so surprising (Harris and Raviv, 1991). For example, since managers typically have more information than outsiders, equity may be mispriced in the market from their point of view. Given that they have the choice of borrowing, the managers may only issue new overpriced equity. They may make investors

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[29] The interest margins of banks reflect the efficiency with which commercial banks perform their main function. Crucially, banks affect the net return for savings and the gross returns for investment. The speed between two returns mirrors the bank interest margins, in addition to transaction costs and borne is directly by savers and investors. This suggests that bank interest spreads can be interpreted as the efficiency of a bank's functions.

[30] More details about Levine and Zerovs (1998a) work will be provided later in Chapter V.

reluctant to invest in new equity issues and it is consequently not surprising that many companies do not rely heavily on new equity to finance new investment. However, this method of evaluating the functioning of stock markets (*i.e.* by the amount of capital raised through it) overlooks some of the important roles the stock market can play in the development process.

The fundamental role played by the stock markets is to facilitate the reallocation of funds from agents (individuals) with an excess of capital given their investment opportunities towards agents (firms) with a shortage of funds vis-à-vis investment opportunities. This implies that stock market development, by reducing the transaction costs of savings and investment, it lowers the overall cost of capital in the economy.

Furthermore, stock markets perform a variety of functions that include helping investors to price and hedge risk more effectively. An equity market allows a firm to diversify some of the risks it faces, by allowing it to sell to other investors who are more willing bear these risks. This allows firms to borrow more and thus encourages growth. Also, from the lender's viewpoint the information set on which much decision-making is dependent is expanded with the existence of a stock market. This allows banks to make better credit assessment and possibly provide additional sources of financing for existing firms. Further, stock markets become important tools for attracting increased foreign capital because of their strength in pricing risk.

An active and well-functioning stock market can also contribute to the overall stability of a country's financial system in two ways. It provides an alternative to bank credit as a source of funding for capital investment by domestic enterprises, and by providing a market for corporate ownership; it can serve as an instrument for exercising market discipline over bank management- if bank equities are publicly traded. Then weak management can, in principle, be discipline by the market for corporate ownership and control (Knight, 1998). Furthermore, a well-functioning pricing mechanism and the related potential for efficient mergers and acquisitions can strengthen market discipline and contribute to a more efficient allocation of capital (Schleifer and Vishny, 1986; and Fledman and Kumar, 1994).

Moreover, the notion of banks and stock markets as substitutes for each other and as competing for finance seems misleading since to a large extent they compete for different kinds of finance. Banks and markets might act as complements in providing financial services and promoting economic development (World Bank, 1995b; Boyd and Smith, 1998; and Huybens and Smith, 1999). Banks are suitable for financing traditional industries such as agriculture where technology is known and where there is a consensus on how firms should be run. Stock markets on the other hand are better suited to financing large industries in which there is a rapid and continuous technological change (Singh *et al.,* 2000)[31] and industries with high concentration ratios in which there is no dominant strategy for the firm (*i.e.* there is disagreement among parties as to what is the optimal strategy for the firm). Carlin and Mayer (1999), using data from 27 industries in 20 OECD countries over the period 1970-1995, find that equity-financed industries carry out more R&D and employ higher skilled workers, while bank-financed industries tend to undertake less R&D. Black and Glison (1998) a find significant correlation between stock market activity and venture capital market development[32]. They argue that a dynamic venture capital sector exists only in stock-market based economies, as opposed to economies dominated by banks, and claim that this is because venture capital requires the exit option that arises through access to stock markets[33].

Furthermore, the amount of equity an investor puts down is limited by the amount of debt he can raise. In other words, in order for banks to lend to investors, investors must fulfil at least two kinds of covenant: meet minimum debt-service coverage ratios and meet prudent bank-stipulated "*debt-equity*" ratios. General experience suggests that firms prefer to finance their investments using debt since the cost of debt (due to its tax deductibility) is lower than the cost of equity. However, debt cannot exist as a replacement for equity beyond a certain level of

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[31] For a theoretical explanation see for example Allen (1993), Subrahmanyam and Titman (1999) and Biais and Casamatta (1999).

[32] Venture capital is defined as investment by specialised venture capital organisations (venture capital funds) in high-growth, high-risk, often high technology firms that need capital to finance product development or growth and must, by the nature of their business, obtain this capital largely in the form of equity rather than debt.

[33] In a more recent empirical study, Singh *et al.,* (2000) investigate the relation between stock market development and both the development and usage of information technology and the development of venture capital using data from 63 developed and developing countries. Their results, however, show that there are weak relationships between stock market development and both information technology development and usage and development of venture capital.

leverage since lenders want the collateral of equity as a cushion. More equity, therefore, allows for more debt. Fully leveraged firms do not exist in any prudent system. As Chirinko and Singha (2000) point out that, "*the capacity of issue debt will be curtailed at sufficiently high leverage ratio by the cost of financial distress and at this point, firms must resort to equity issues*" (p.419)[34]. In summary, the absence of a well-functioning stock market may limit the ability of firms to achieve an efficient mix of debt and equity, in spite of a well-functioning debt market. In this sense, stock market and banks may function as complements, rather than substitutes, and a stock market that functions well may have positive externalities for the rest of the banking system[35].

Furthermore, stock markets offer an exit option for entrepreneurs and therefore decrease banks' market power (Stulz, 2000)[36]. Stock markets also enable an entrepreneur who has obtained bank financing to realise profits from a successful project by selling it. An entrepreneur considers not only the profits generated in a new venture but also the possibility of a lump-sum gain through selling the venture to the public. The existence of well-functioning stock markets (efficient stock markets) increases the return for entrepreneurs and thus the incentives to undertake risky venture projects (Davidson and Henrekson, 2000; and Stulz, 2000)[37]. Thus, together, banks and stock markets work to promote growth.

The limited availability of debt finance in many developing countries, including bank loans which may be limited to a select group of companies, can also make stock markets necessary to finance other groups in developing countries. This limitation can reflect endogenous constraints in credit markets, resulting from adverse selection and incentive problems. Adverse selection in credit markets refers to a situation where a rise in interest rates may lead to a less favourable composition of the group of loan applicants. This may happen because borrowers prepared to pay higher interest rates are usually risk lovers, so they take on projects

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[34] In addition, high gearing made the corporate sector financially fragile and vulnerable to interest rate and exchange rate shocks (Glen, *et al.*, 2000).

[35] This argument will be discussed in detail in Chapter VIII.

[36] Weinstein and Yafeh (1998) argue that bank dependence can lead to a higher cost of funds for firms because banks extract rents from their corporate customers.

[37] If the stock markets are not efficient, then the public offering will be less feasible as a result of high transaction costs or the uncertainty of getting a fair price in the stock market. Thus, inefficient stock markets may reduce the incentive to enter new ventures, reducing overall long-term productivity of the economy.

that are characterised by higher profits if they succeed, combined with a high probability of failure. On the other hand, borrowers with the highest probability of success may decide not to undertake their project after an increase in the lending rate. Hence, more risk-averse borrowers may drop out of the pool of loan applicants when a lender increases the interest rate. This problem may give rise to another problem- the so- called "*moral hazard*". Moral hazard refers to a situation when two parties agree on a contract, but where one party afterwards takes an action that is not observed by the other agents. The hidden actions are meant to increase the welfare of the informed agent at the expense of the uninformed agents[38].

Stock market can also play an important role in influencing the success of the public enterprise reform strategy (privatisation), which is an important component of policy strategies to accelerate economic growth, especially in many developing countries (Pohl *et al.,* 1995; Hermes and Lensink, 2000; and Scholtens, 2000). In particular, the existence of a well-developed stock market helps determine variable options for privatisation. A well-functioning stock market promotes privatisation by enabling public offerings. Using a public offering to obtain widespread ownership of enterprises requires a liquid stock market to be able to absorb the new issues without negatively affecting the market as a whole. The existence of a well-developed stock market, furthermore, makes it easier for governments to privatise their projects since privatisation leads to widespread public ownership is often politically more acceptable to the public than sales to a small group of investors (Lieberman and Kirkness, 2000). Stock markets can also play an important role in financing privatisation by complementing the banks' ability to mobilise savings (Demirguc-Kunt and Levine, 1999). Privatisation through public share offerings can also spur the development of stock markets, directly through the capitalisation of the stock market and through higher equity valuations and trading liquidity, and indirectly through increasing opportunities for portfolio diversification, accelerating the development of an institutional framework, and increasing investor confidence (Perotti and Oijen, 1995, 1997, 2001).

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[38] Equity markets also face the same adverse selection problem as debt markets. Nor are they free from "*moral hazard*" problems. But shareholders are in a better position to deal with "*moral hazard*", since their vote allows them to exert some control over the managerial board. Moreover, if they strongly disapprove of their managers, they can sell their stocks. If a sufficient number of shareholders do this, the price of the stock will fall, increasing the firm's cost of capital in the future and exposing it to a hostile takeover.

4.6 Summary and Conclusion

Economists have long stressed the importance of financial markets in fostering economic growth. Early contributions by Goldsmith (1969), Shaw (1973) and McKinnon (1973) mentioned the empirical correlation between financial markets and economic development. They argued that financial markets promote growth through greater accumulation of capital, improved mobilisation of capital and by enhancing efficiency in resource allocation. Theoretically, however, links between financial development and growth are difficult to formalise. In traditional growth theory, financial development could only have an influence on the level of economic activity, but not on its long-term growth rate.

The development of endogenous growth models, which show that growth rates can be related to institutional arrangements, has made it possible to formalise the presentation of the interactions between financial markets and economic growth. However, the role and the impact of stock markets on the economic growth process have not received as much attention as other elements of the financial sector in theoretical studies. Historically, these studies have focused on banks. Recently, more attention has been given to the role of stock markets on the economic growth process. However, all these studies concentrate on specific aspects of stock markets and their impact on real activity. None of them has provided a comprehensive framework of the different effects of stock markets and at empirically testable relationships.

The existing theoretical literature has identified various mechanisms to explain the positive influence of stock markets on the long-term economic growth rate. The mechanisms emphasised by these studies rely on the premise that stock markets help to promote physical capital accumulation, improving capital mobilisation and increasing productivity growth through the facilitation of (risky) technological advances and inducing the real economic efficiency with which resources are utilised. Stock markets can do this by providing different functions: specialising in collecting information, evaluating projects, sharing risks, providing liquidity, exerting corporate control, and mobilising capital.

Yet, the role that stock markets play in stimulating economic growth is not undisputed. It may be that more liquid stock markets, with a substantial amount of small shareholders and hence

diffuse ownership, decrease incentives to monitor the investors carefully. Moreover, liquid equity markets may facilitate hostile takeovers, which decrease the efficiency of resources allocation. There are also some researchers who argue that stock markets even in developed countries do not perform monitoring, screening and disciplinary roles very well. Stock markets do not have an important role since only a small part of corporate investments is financed by means of equity. Stock markets may even have a negative effect since they are merely "*Casinos*". Moreover, because most stock markets in developing economies are very thin, Singh (1997a), for example, argues that this may lead to excessively volatile share prices. Stock price volatility may seriously hamper economic development. Some researchers also argue that because the stock markets have many more problems with asymmetric information, banks are more suitable for developing countries. The reason is that stock markets very often provide investors with short-term finance, whereas banks, especially group-banks, have long-term relationships with firms. In other words, stock markets may suffer from "*short-termism*".

Taking in to account the literature which has been reviewed in this chapter, the following chapters investigate empirically the stock market development-growth link and examine whether the stock market and banking sector are complementary or substitutes for each other in providing financial services and thereby enhancing economic growth in the case of the small developing country of Jordan. In these chapters we shall introduce different empirical methodologies to analyse the link between stock market development and economic performance.

Chapter V

Macroeconomic Evidence: Stock Market Development and Economic Growth

5.1 Introduction

As we have shown in Chapter IV, much of the criticism concerning the development of stock markets, especially in developing economies, arises from the speculative nature of these markets, and the fact that these markets cannot be enforced in developing countries due to information problems. lack of prudent regulatory bodies, high transaction costs, inadequate competition, and lack of investors due to imperfect information flows. Based on these arguments, critics' content that stock markets in developing economies do more harm than good by distorting capital formulation and resources allocation. The conclusion is therefore that a bank-based financial system is more suitable for developing countries.

Levine and Zervos (1998a) pose a question as to whether stock markets are merely burgeoning casinos where more and more players are coming to place bets, or whether they are importantly linked to economic growth. As mentioned in Chapter III, the main objective behind the establishment of a stock market in Jordan (AFM) has to contribute to raising capital and assisting its allocation process in order to strengthen the Jordanian economy. Consequently, in order to investigate whether the AFM achieves its objective in enhancing the macroeconomic growth of the country, this chapter proposes a simple plausible framework for studying some elements of endogenous growth that relate to the main aspects of the functions of financial markets. In particular, in this chapter we make the following two main contributions. First, we extend a simple model of a Romer (1986), Lucas (1988), Rebelo (1991), and Pagano (1993a) type of endogenous growth economy in order to incorporate the effect of financial markets. Utilising the theoretical literature that we have reviewed in Chapter

IV, we argue that the degree to which financial markets, particularly stock markets, influence real economic growth depends on how effectively they improve capital accumulation, facilitate capital mobilisation and increase the productivity of capital investment. Second, the model is estimated and tested on an individual country- Jordan. This study therefore represents the first attempt to examine the link between stock market development and economic growth in the experience of a specific country, and thus its results will be appropriate for policy recommendations to other developing countries with a similar economic structure.

The particular questions we are trying to answer in this chapter are the following: does the development of the stock market have any influence on Jordan's real economic growth? If it does, have the level of stock market development and the level of banking sector development both influenced Jordan's economic growth? If they have, this suggests that both the banking sector and the stock market in Jordan may have an independent empirical connection with Jordan's economic growth. In order to examine these issues, we include in our analysis variables for the banking sector development, specifically, in the regressions we simultaneously include the banking sector and the stock market development indicators. Furthermore, we control for economic factors that may influence the economic growth, in order to gauge the sensitivity of results to changes in these variables.

The remainder of this chapter is organised as follows: Section 5.2 provides a review and discussion of the shortcomings in the existing empirical literature in this field. In section 5.3 the theoretical framework is presented. We describe the empirical methodology and the variables and their measurements in section 5.4. Section 5.5 describes data sources and statistical descriptions. The main results of the chapter are contained in section 5.6. Finally, section 5.7 contains the summary and the conclusion to the chapter.

5.2 Previous Empirical literature

There are many studies that emphasise the links between the state of development of a country's financial sector and the level and rate of economic growth. The argument essentially is that the functions the financial sector provides are an essential catalyst of economic growth. This type of empirical study started with Goldsmith (1969), and McKinnon (1973), and more

recently, Ghani (1992), King and Levine (1993a,b), Degregorio and Giudotti (1995), Rousseau and Wachtel (1998), Beck *et al.*, (1999b), Levine *et al.*, (2000), Levine (2000) and others. While all these studies utilise bank measures of financial development, with the exception of a very few recent empirical works: Atji and Jovanovic (1993), Harris (1997), and Levine and Zervos (1996, 1998a), the role of stock markets in the macroeconomic development process has been completely ignored[1]. A part of the problem may stem from the absence of indicators that can accurately measure the extent of stock market development.

Atji and Jovanovic (1993) used a reduced form of an equation derived from an argument of Greenwood and Jovanovic (1990) to determine empirically whether stock market development has a transitory level effect or permanent growth effects. They find a significant correlation between growth over the period 1980-88 and the value of stock market trading divided by gross domestic product (GDP) for 72 countries. Therefore, they conclude that stock markets on their own can raise a typical developing countries economic growth by a rounding 2.5 percent per annum. As can be seen, Atje and Jovanovic succeeded in obtaining favourable results for the hypothesis that the development of the stock market has positive effects on growth, but over quite a short period (1980-1988), which does not really seem representative of long-term trends.

Following the methodology of Atji and Jovanovic (1993), Harris (1997) re-examined the empirical relationship between stock market development and economic growth utilising sample data covering 49 countries during the period 1980-91. His findings on the effects of stock market development on economic growth were the same as those of Atji-Jovanovic found. When he divided his sample into developed and developing countries, he found that for less developed countries, the stock market development effect is similar to that found for the full sample. For developed countries, however, stock market development has less effect.

In order to evaluate the relationship between stock market development and national growth rates, capital accumulations, rates of technological change, and savings rates, in the two important recent papers, Levine and Zervos (1996, 1998a) build on Atji and Jovanovic's study using various measures of stock market development. They argue that well-developed stock

[1] To the best of our knowledge.

markets may be able to offer different kinds of impetus to investment and growth from the development of the banking system. In particular, they show that increased stock market capitalisation measured by the ratio of the stock market value to GDP, may improve an economy's ability to mobilise capital and diversify risk. Liquidity is another important indicator of stock market development in that it may be inversely related to transaction costs, which impede the efficient functioning of stock markets. Liquidity is measured by total value of shares traded relative to either GDP or total market capitalisation. The latter is known as the turnover ratio and may be an indicator of the level of transaction costs. Other stock market developments indicators in which Levine and Zervos used are the volatility of market returns and the ability of markets to diversify risk internationally- the degree of stock market integration with world markets.

Using data from 47 countries over the period 1976-93 Levine and Zervos run cross-country regressions and find that stock market liquidity is positively and significantly correlated with current and future rates of economic growth, capital accumulation, and productivity growth. They also find after including both stock market and bank indicators in the same regressions, that both banking development and stock market liquidity are good predictors of economic growth, capital accumulation and productivity growth. They conclude that stock markets provide different services from those provided by banks. What kind of different services, however, is not explained. They also find that volatility is insignificantly correlated with growth, similarly, market size and the degree of market integration are not robustly linked with economic growth, capital accumulation, and productivity growth[2]. Also, none-of the stock market indicators is robustly related to private savings rates[3].

Since all the previous empirical studies are based on cross-country growth regressions they are subject to criticism. They do not explicitly confront the issue of causality- stock market development may predict economic growth simply because stock markets anticipate future growth (Levine, 1997)- thus stock market development may simply be a leading indicator

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[2] In more recent study, however, Leahy *et al.*, (2000) and Bassanini *et al.*, (2001) find evidence from OECD countries (using panel data analysis) that the degree of stock market capitalisation is strongly related to both economic growth and to the investment rate.

[3] Bonser-Near and Dewenter (1999) also provide evidence from 16 emerging markets over the period 1982-93 that the growth of the stock market is not necessarily associated with higher savings rates.

rather than a causal factor. In particular, this approach involves averaging out variables over a long time period, and using them in a cross-section regression aimed at explaining cross-country variables of growth rates. Therefore, this technique cannot allow different countries to exhibit different patterns of causality, yet it is likely that in some countries the stock market is a leading sector whilst in others it lags behind the bank sector. This means that the causality result is only valid on average. As pointed out by Quah (1993), Lee *et al.,* (1996) and Arestis and Demetriades (1997), it is difficult to draw any causal inferences from the cross-section regression methodology used in such work.

Consequently, one should refrain from interpreting the coefficients of explanatory variables as indicative of the elasticity that predicts the magnitude of change in growth following a particular policy reform. All the coefficient estimates and corresponding t-statistics from cross-section regressions does not help evaluate the strength of partial correlation between explanatory variables and explained variables. As pointed out by Harberger (1987) "*...regressions cross country do not resolve causal issues, nor do the regressions describe a single piece of machinery over time. They should be viewed as evaluating the strength of the partial correlation and not behavioural relationships that suggest how much growth will change when the right-hand-side variable changes. The results unearth suggestive empirical regularities and should not be interpreted as stylised facts, or as behavioural relationships*" (p. 265).

Moreover, Rajan and Zingales (1998) argue that both stock market development and growth could be driven by a common omitted variable such as the propensity of individuals in the economy to save. Since endogenous savings (in certain macroeconomic models) affect long-term growth, it may not be surprising that growth and stock market development are correlated. This argument is hard to refute with simple cross-country regressions. In the absence of a well accepted theory of growth, the list of potential omitted variables for which the stock market might be a proxy is large, and the explanatory variables to include a matter of conjecture (Paxson, 1996).

Further, the cross-country regressions suffer from three kinds of error: measurement errors, statistical errors, and conceptual errors. Measurement errors occur when the variables are

defined collected, and measured incorrectly across different countries. Moreover, published data sometimes fail to capture the reality on the ground. A statistical error occurs when the regression analysis assumes that the observations are drawn from the same population; yet vastly different countries appear in cross-country regressions.

Conceptually speaking, the coefficients of such studies should be interpreted with extreme caution. This is because when studying long periods of time, many changes occur simultaneously: countries change policies, economies experience business cycles, perceptions and performances of people change, and governments change. Hoping to capture all such changes by means of certain explanatory variables averaged over time is being rather optimistic. Thus, aggregation trends to blur importance and events across countries.

In consideration of the above-cited limitations of the cross-sectional method of studying growth, which is a truly dynamic concept, we believe that the results of Atji and Jovanovic (1993), Harris (1997) and Levine and Zervos (1996,1998a) are subject to criticism, and we also do not believe that the equation of causality is addressed satisfactory in these studies. In summary, however, in these studies, there is no consensus that the existence of a stock market causes economic growth. Demetriades and Hussein (1996) and Stulz (2000) have shown evidence that the issue is very much country-specific, which agrees with the views recently expressed by the World Bank (1993), that economic policies are country-specific and their effectiveness depends on the effectiveness of the institutions which implement them.

Finally, another shortcoming in these studies is that most of them do not provide a theoretical framework to support the empirical specifications. Also most of the previous studies employ only the stock market development variable as the determinant of economic growth in the regression equations that are empirically estimated. By neglecting other growth-determining variables, such as the share of investment in the GDP, human capital stock, macroeconomic stability and the degree of openness of an economy, their estimates of the impact of stock market development variables could hardly be free of the bias caused by the omitted variables. In addition, most of the earlier studies did not take in to consideration the possibility of the

endogeneity of stock market development. It may be argued that stock market development is not exogenous in that it may be simply a leading indicator rather than a causal factor[4].

Consequently, in this chapter we attempt to address the gap in this field by providing an empirical analysis of the effect of stock market development on economic growth in an individual country- Jordan- by proposing a simple plausible framework that suggests that the stock market may influence economic growth through improved capital accumulation, the facilitation of capital mobilisation and the increased productivity of capital investment. Empirically, we use a Two-Stage-Least-Squares (TSLS) approach to correct for the endogeneity of independent variables, specifically the level of financial development. The TSLS approach allows us to address the issue of endogeneity of independent variables by using instrumental variables. However, the main difficulty in using this method is to find suitable instruments for endogenous variables. Such instruments must, in each case, be sufficiently highly correlated with the explanatory variables and uncorrelated with the error term. However, econometrics textbooks commonly recommend using either the preceding or subsequent period value of an explanatory variable as its instruments[5]. Consequently, we used a one-lagged value of endogenous variables as instruments' in our estimation of the TSLS regressions.

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[4] Barro and Sala-I-Martin (1995) point out that, "*it is unclear whether the relation between growth and financial sophistication isolates the effect of an exogenous improvement in financial system on the growth rate, or, in inverse, reflects the impact of good growth prospects on the incentive to develop the financial sector*" (p.443). Pagano (1993a) shows that regulatory and institutional factors may influence the development of stock markets. In important studies, La Porta *et al.,* (1997, 1998, 1999, 2000) show that the quality legal and accounting standards are important determinants of stock market development. They find that countries that protect shareholders have more valuable stock markets, a larger number of listed securities per capital, and a higher rate of IPO (Initial Public Offering) activity that do the unproductive countries. In addition, using pooled data from fifteen industrial and developing countries from 1980 to 1995, Garcia and Liu (1999) find that real income, savings rate, and financial intermediary development are important determinants of stock market development measured by market capitalisation. Using data from 16 emerging markets, Levine and Zervos (1998b) investigate the effect of liberalisation of restrictions on international flows on stock market development. They find that stock markets become larger, more liquid, more internationally integrated, and more volatile following the liberalisation of restrictions on capital and dividend flows. Moreover, Boyd *et al.,* (1996) examine the effect of macroeconomic stability measures by inflation and stock market development. They find that inflation and the development of the stock market are very negatively correlated. Thus, there is clear evidence that stock market development is not a completely exogenous determinant. In our case also, it was clear from Chapter III that macroeconomic evolution, particularly macroeconomic stability, is an important factor for stock market development in Jordan. Therefore, it is important to correct for the endogeneity of stock market development in the empirical analysis.

[5] See for example, Thomas (1985, Chapter 3, p. 42-77) and Kennedy (1998, Chapter 9, p. 137-50).

5.3 Theoretical Framework

As shown in Chapter IV, the modelling of financial markets and the investigation of their welfare economics and growth implications are still in their infancy. The claims that the effectiveness of financial markets and the level of real activity are closely related are, however, not new. Against the background of neoclassical growth theory these studies could argue only temporary efficiency effects resulting from financial market development. More recent developments in growth theory allow for level as well as growth– path effects, but these models, as we have shown in Chapter IV, concentrate on specific aspects of stock markets and their impact on real activity. For example Bencivenga *et al.,* (1995) and Levine (1991) in their model emphasised that stock markets provide liquidity, allowing a shift from current liquid but unproductive assets towards less liquid but more productive assets, thereby increasing the funds available for productive capital. Greenwood and Jovanovic (1990) argue that stock markets promote the acquisition and dissemination of information, thus allowing more economic efficiency. Saint-Paul (1992) argues that stock markets permit agents to increase specialisation, shifting away from less specialised and inefficient technologies, and thereby affecting the availability of financial markets. All of these researches cover important aspects of stock markets and their impact on real activity, providing important analytical insights into issues raised in the literature. However, they all fall short of providing a comprehensive framework of the different effects of stock markets and of empirically testable relationships.

Utilising the theoretical literature mentioned above, we can identify three fundamental channels through which the functions of financial markets influence economic growth:

- Financial markets development mobilises and allocates resources to their efficient use.
- Financial markets development may change the savings rate and hence affect physical capital accumulation.
- Financial markets development increases the productivity of capital utilised in an economy.

To shed more light on how financial development, especially stock market development, can influence economic growth, we present a simple framework based on an endogenous growth

model (AK) as exemplified by Romer (1986), Lucas (1988), Rebelo (1991), and Pagano (1993a).

Suppose the aggregate of output, y, is produced according to the following constant-returns-to-scale production function:

$$y_t = AK_t \tag{5.1}$$

$$y_{t+1} = AK_{t+1} \tag{5.1a}$$

$$or \qquad \left[A = \frac{y_{t+1}}{K_{t+1}} \right] \tag{5.1b}$$

$$y_{t-1} = AK_{t-1} \tag{5.1c}$$

where K and t are the capital stock and time respectively; and A is a variable which measures the social marginal productivity of capital or the level of total factor productivity which has two components: economic efficiency and the level of technological progress.

For the sake of simplicity we shall assume that population is stationary, and that the economy produces a single good, which can be invested or consumed: if the good is invested, it depreciates at the rate, δ, per period, then the gross investment is equal to:

$$I_t = K_{t+1} - (1-\delta)\ K_t \tag{5.2}$$

$$K_{t+1} = I_t + (1-\delta)\ K_t \tag{5.2a}$$

where I is the level of investment. In a closed economy with no government, capital market equilibrium requires that gross saving S, equals gross investment I:

$$S_t = I_t \tag{5.3}$$

In the process of transforming savings into investment, the stock market and other intermediates absorb resources so that a dollar saved by households generates less than one dollar's worth of investment. Since households invest only a fraction of their savings then capital market equilibrium:

$$\beta S_t = I_t \qquad (5.4)$$

$$or \qquad \beta = \frac{I_t}{S_t} \qquad (5.4a)$$

The remaining fraction (1-β) goes to the stock market as commission, fees, *etc* and to other financial intermediaries *i.e.* banks, as the spread between lending and borrowing rates (and is lost in the process of the stock market and other financial intermediates). The leakages of financial resources may also reflect economic efficiency or the so-called X-efficiency of financial markets.

Growth rate at time t+1 can be defined as:

$$G_{t+1} = \frac{\Delta y_t}{y_t} \qquad (5.5)$$

$$= \frac{y_{t+1}}{y_t} - 1$$

$$G_{t+1} = \frac{y_{t+1}}{y_t} - 1 \qquad (5.5a)$$

since $y_t = AK_{t+1}$, substituting this into (5.5a) yields:

$$G_{t+1} = \frac{AK_{t+1}}{y_t} - 1 \qquad (5.5b)$$

substituting the value of AK_{t+1} from (5.2a) into (5.5b) yields:

$$G_{t+1} = \frac{A\left[I_t + (1-\delta)\ K_t\right]}{y_t} - 1$$

dropping all subscripts for a steady state of growth:

$$G = \frac{AI}{y} + A\left[\frac{(1-\delta)\ K}{y}\right] - 1$$

$$G = \frac{AI}{y} + A\left[\frac{K}{y} - \frac{\delta K}{y}\right] - 1 \qquad (5.6c)$$

substituting the value of K / y from (5.1b) into (5.6c) yields steady state growth:

$$G = \frac{AI}{y} + A\frac{1}{A} - A\delta\frac{1}{A} - 1$$
$$= \frac{AI}{y} - \delta \qquad (5.7)$$

substituting the value of "I" from (5.4) into (5.7) yields:

$$G = A\beta\frac{S}{y} - \delta \qquad (5.8)$$

we can rewrite the equation (5.8) as follows:

$$G = A(\beta s) - \delta \qquad (5.9)$$

where $s = S / y$.

Equation (5.9) suggests that at steady states, the real economic growth rate is some composite of the social marginal productivity of capital, the proportion of total savings that are mobilised to investment, and the savings ratio. In identity form, a re-interpretation of equation (5.9) can be written as follows:

$$G = \ln A + \ln \beta + \ln s \qquad (5.10)$$

The idea is that the above identity, equation (5.10), represents a composite of the three main mechanisms by which financial development may induce endogenous economic growth:

1) It can raise β the proportion of savings channels to investment (mobilisation and allocation of capital to its efficient use).
2) It can contribute to raising s, the savings rate and, thus, physical capital accumulation, and
3) It can increase A, the level of total factor productivity, by influencing economic efficiency or the level of technological progress.

Financial markets and institutions play a key role in mobilising and allocating resources to their efficient use. Stulz (2000) points out that, "*even though a country has savings, its growth can be stunted because its financial system fails to direct these savings where they can be invested most efficiently*" (p. 11). Wargler (2000) stresses, "*a fundamental job of the economy*

is to allocate capital efficiently. To achieve this, capital is supposed to be invested in the sector that are expected to have high returns and be withdrawn from sectors with poor prospect...financial markets and institutions do more than just provide a sideshow to the real economy; they perform a fundamental allocative function" (p.187-188). Financial systems aggregate the small savings of numerous investors for use by agents with entrepreneurial and managerial talents who need funds for large-scale capital investment. Financial markets can ease capital mobilisation and allocate it to more efficient uses by providing investors as well as entrepreneurs with liquidity and risk pooling facilities. Also one of the main impacts of liquidity and risk pooling and sharing is promoting technological innovations. By easing the burden of risk and liquidity to capital contributors as well as to the entrepreneurs, markets and institutions enable the undertaking of risky technological inventions and innovations.

Financial markets and institutions that are not sufficiently developed may either fall short of receiving all potential savings from households or divert many of the savings away from investment. With underdeveloped financial markets, individuals may allocate some of their savings to passive instruments, such as gold, which cannot be used directly for physical investment. With the development of efficient financial markets and institutions, more savings would be channelled to the financial sector and this would increase the amount of funding channelled to the most productive investments and therefore lead to economic growth.

The degree of development of stock markets and other financial institutions may also affect the savings rate of households. However, evidence is ambiguous as to whether a more developed and efficient stock market would increase the proportion of income that individuals save. Improved efficiency, additional liquidity, and the ability to realise capital gains from stock markets might increase the returns on savings. As is well known, savers are offered higher returns.

A higher return on savings, however, does not necessarily translate into higher savings. The decision on savings is dependent on two countervailing effects. The decision of the household on how much to save depends on its performance with regard to present versus future consumption. With a higher return on savings, consuming in the future becomes relatively cheaper. This induces the household to give up current consumption for higher consumption in

the future and therefore save more. This is called the "*substitution*" effect. However, the higher rate of return on savings implies that households need to save less in order to obtain the same level of future consumption as before. This is called the "*income*" effect, which leads to a lower savings rate. Thus, the total effect of increased returns on the savings rates is a little more ambiguous.

The insurance function of financial markets and institutions also has ambiguous effects on the savings rate. As we mentioned before, financial markets are suppose to provide individuals with insurance against liquidity shocks. In the absence of banks or stock markets, individuals need to put aside cash for unforeseen emergencies. They cannot invest all their savings in physical assets, because assets cannot be easily liquidated. For instance, with the existing financial intermediation that pool individuals' savings, individuals who face a liquidity shock can get their savings back by withdrawing deposits from the bank or selling stock. Clearly, more savings will be channelled to physical assets, but whether individuals will increase aggregate savings is not clear[6].

Increasing the productivity of investment represents the third channel through which financial markets and institutions impact economic growth. This channel is undoubtedly the primary role of financial market and is generally believed to be far more relevant to growth than other channels (Stiglitz, 1989; and Bossone, 2000). As we have shown before, the existing theoretical literature has identified two main functions to explain the positive effect of financial markets, especially stock markets, on productivity of investment and thereby growth. In particular, stock markets can do this through their monitoring and information production functions[7]. By aggregating and disseminating information about firms, stock markets provide incentives to gather information, which becomes reflected in stock prices. This information production role has consequences that have efficiency implications. It is very important for entrepreneurs in augmenting their understanding of the market environment. It provides

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[6] Jappelli and Pagano (1994, 1999) argue that the increased availability of credit and insurance to households, which is associated with financial development, reduce the propensity to save. Thus, they suggest that financial development can harm rather than strengthen the process of capital accumulation.

[7] In addition, according to Saint-Paul (1992) markets can increase investment productivity through a greater division of labour. By enabling agents to hedge against risk through holding diversified portfolios, financial markets permit a division of labour which implies specialised and therefore more productive technology.

knowledge about how investors evaluate both their own and their competitors' current decisions, future plans and managerial performance. It enhances entrepreneurs' knowledge about efficient firms' operation and their ability to develop more efficient production methods. The information reveals the general belief in the current and future prospects of the economy as a whole.

Financial institutions also provide an information production function. Instead of informed traders producing information through trading and conveying it via prices, banks hire loan officers who produce information while evaluating projects for loan financing. The information created by loan officers, however, is not as widely disseminated and the firms are not accessed as continuously and efficiently as when they are traded on the stock markets. Most of the information collected by banks remains as private assets. In the sense of influencing the whole economy, from this point of view, stock markets are certainly more significant than banks. Stock markets can thus play a unique role in furthering productivity and long-term economic growth.

Markets and institutions can also increase productivity of investment by playing a controlling and monitoring role. The markets can promote productivity through monitoring in a number of ways. Managerial incentives that use information on stock prices reduce shirking. In general, it aligns managerial interest to that of shareholders, reducing the potential for under- or over-investment vis-à-vis the optimum. Through the mechanism of the market for corporate control inefficient management is forced out of office. More importantly, the threat of takeover induces managerial discipline, deterring management from taking actions that waste firms' resources.

In summary, the growth in output (G) in an economy, which is an aggregate measure of performance, is partly determined by the effectiveness and efficiency of the financial markets and institutions in performing liquidity, risk-pooling and sharing, information and monitoring functions.

5.4 Empirical Model and Variables Measure

5.4.1 Empirical Model

In order to investigate empirically the strength of the correlation between stock market development and the growth rate of economic activity in Jordan, we have to determine first the version of the empirical model that we will use to examine this relation. In order to do this we extend the endogenous growth model mentioned above to incorporate the stock market development effects. As we have shown, the expressions for growth in (5.10) are combined with three equations that capture the effect of financial market development on growth: the social marginal productivity of capital (A), or what is called the level of total factor productivity, the savings rate (s) and the proportion of savings channelled to investment (β). Based on the theoretical framework proffered above, we consider the behavioural nature of these equations as follows: First, we assume that the behaviour of s and β are influenced by some measurements of stock market development as follows:

$$\ln s_t = \varphi_0 + \varphi_1 STOCK_t + \eta_t \qquad (5.11)$$

$$\ln \beta_t = \delta_0 + \delta_1 STOCK_t + \mu_t \qquad (5.12)$$

where $STOCK_t$ is the vector of stock market development measurement, η_t and μ_t are the white-noise error terms, and t represents time period. Second, the behaviour of A, is influenced by stock market development, and following Romer (1986) and Locas (1988) it is influenced also by capital-output ratio and human capital accumulation, hence:

$$\ln A = \rho_0 + \rho_1 STOCK_t + \rho_2 (K_t / Y_t) + \rho_3 H_t + \upsilon_t \qquad (5.13)$$

where K/Y is capital-output ratio, H_t is an indicator of human capital, and υ_t is white-noise error term. Substitute equations (5.11), (5.12) and (5.13) into (5.10) and we obtain the following empirical model:

$$G_t = \alpha_0 + \alpha_1 (K_t / Y_t) + \alpha_2 H_t + \alpha_3 STOCK_t + \varepsilon_t \qquad (5.14)$$

where ε_t is white-noise error term ($\varepsilon_t \approx iidN(0, \sigma_\varepsilon^2)$). The argument in the above basic empirical model is that the savings and investment activities in the financial markets, *e.g.* stock markets, induce economic growth endogenously. Consistent with the growth literature, we used the growth rate of per capita real GDP as a measure of real economic growth. We generated the growth rate of real per capita GDP as the first difference in the logarithm of the real per capita GDP series. Consistent with most studies in economic growth, we used the secondary school enrolment rate as a proxy for the stock of human capital (H_t)[8].

Data on the capital stock for Jordan are not available as such, thus making it difficult to estimate a long-term growth equation such as (5.14). And since no existing methods are reliable for estimating such data[9], we make simplified assumptions to transfer equation (5.14) into a form that can be estimated. Following recent growth studies[10], we use the investment-output ratio (I/Y), rather than the capital-output ratio (K/Y). Thus, our basic statistical model used to test the impact of stock market development on the country's economic growth is specified as follows:

$$G_t = \alpha_0 + \alpha_1 (I_t / Y_t) + \alpha_2 H_t + \alpha_3 STOCK_t + \varepsilon_t \qquad (5.15)$$

As mentioned before, the main objective of this chapter is to test the hypothesis that stock market development in Jordan is robustly correlated with real economic growth. Thus, our explanatory variable, whose influences we are interested in, is the stock market development indicator ($STOCK_t$). If the coefficient estimate of this variable enters positively and statistically significantly into the growth regression, this implies that by providing more

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[8] Empirically human capital is proxied by many variables including primary school enrolment rate, secondary school enrolment, total estimated average schooling years and labour force participation rate. Although none of them can perfectly represent human capital, secondary school enrolment rate is widely used in many studies (Barro, 1991; Mankiw, *et al.,* 1992; Levine *et al*., 2000; and others).

[9] One of the greatest difficulties in estimating the capital accumulation data is in determining the initial capital stock K_0. Some researchers base their estimate on an assumption of an initial capital stock of zero (see for example, King and Levine, 1993a) others suggest deriving a guess of the initial capital stock in 1950, which assumes that a country was at its steady-state capital-output ratio in 1950 (see for example, Harberger, 1978, 1998; Collins and Bosworth, 1996; Orlov, 1999; Levine and Zervos, 1998a; Beck et al, 1999b; and Levine, *et al.,* 2000). All these assumptions are surely wrong and basing estimates on any of them will not give a real picture of the capital stock accumulation.

[10] See for example Ghura (1997) and Beddies (1999).

accurate information about production technology, exerting corporate control, facilitating risk management and improving the liquidity assets available to savers, a more developed stock market can enhance productivity growth, facilitating resource mobilisation to most efficient use, and encouraging investment in higher productive activities, thereby accelerating real economic growth.

As we have shown in Chapter IV, an intensive debate in the literature focuses on the relative merits of stock markets as opposed to banks. Many authors stress the advantages that banks have over stock markets in financing a country's economic growth. Others, however, emphasise the comparative merits of stock markets. Another argument is that the stock market versus banks debate is of second-order importance. According to this view, both banks and stock markets arise to ameliorate information and transaction costs and thereby provide financial services that enhance economic growth. Furthermore, banks and stock markets might act as complements in providing financial services and promoting economic growth. Therefore, in addition to the main objective of this chapter we can examine an important issue: whether the stock market and the banking sector are substitutes for each other or complementary in providing financial services and promoting economic growth in Jordan, and whether the stock market or the banking sector is better at facilitating economic growth, or if it is the overall level of financial development that is critical for economic growth.

In order to examine the above issues, we require in our empirical model to account for the effect of banking sector development. Consequently, we add to the basic empirical model (equation 5.15) another variable ($BANK_t$) that measures banking sector development. If the coefficient estimate of the stock market development indicator ($STOCK_t$) is still significant and relatively stable after including the banking sector development indicator ($BANK_t$), this implies that the stock market and the banking sector are complementary rather than substitutes in providing financial services to the Jordanian economy. The magnitudes of the coefficients estimate of the stock market and banking sector development indicators provide us with an indicator about the importance of stock market development compared with banking sector development in enhancing economic growth in Jordan.

In the light of the recent empirical literature on growth, which has identified a large number of variables that are partially correlated with growth, we also run other regressions to evaluate the strength of partial correlation between real per capita GDP growth and each of the stock market and banking sector development indicators to changes in the conditional information set. Specifically, besides the above explanatory variables, we include three variables that are most generally used in growth literature.

5.4.2 Variables Measure

The following paragraphs provide a detailed description of (1) the stock market development variables, (2) the banking sector development variables, and (3) the conditioning information set variables.

A. The Stock Market Development Variables

These variables are of particular analytical interest for this study. As mentioned above, well-functioning stock markets can play an important role in economic development processes by performing the following functions: aggregate and mobilise capital, enhance liquidity, provide risk pooling and sharing services, monitor managers and exert corporate control. It is difficult, however, to construct accurate measures of these functions. Consequently, in this study we use indicators to suit the purpose of the concept of stock market development, by constructing proxies for stock market development that are most commonly used by academics and practitioners (see Demirguc-Kunt and Levine, 1996a; Levine and Zervos, 1998a,b; and Beck *et al.*, 1999a). These indicators are associated with the size, stability, and liquidity of the stock market[11]. While these indicators may be still imperfect measures of how well a stock market performs the above functions, these measures or indicators together may provide a more accurate picture than if we use only a single indicator.

Specifically, in this chapter we use six indicators related to stock market development. We use one measure of stock market size, one measure of stock market volatility, and four measures of stock market liquidity.

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[11] Levine and Zervos (1998a) also discuss integration with world markets, but we refrain from the analysis, since it is difficult to compute time-series estimates of market integration.

1. Stock Market Size

We use market capitalisation adjusted for the size of the economy *i.e.*, market capitalisation divided by the GDP, as indicator of stock market size. The market capitalisation refers to the total value of listed shares on the stock exchange. Capitalisation of a company is calculated by multiplying the number of shares outstanding of that company by its share price. To calculate the market capitalisation, this information is aggregated for all the companies listed in the stock market. The assumption underlying the use of this variable as an indicator for stock market development is that the size of the stock market is a measure of the availability of finance (Zingales, 1996; Demirguc-Kunt and Maksimovic, 1998; and Subrahamanyam and Titman, 1999) and the ability to mobilise capital, diversify the risk and resources allocation processes. Bekaert and Harvey (1995b, 1997) also argue that the ratio of equity capitalisation to GDP is a useful tool in characterising the time-series of market integration. A large market size (market capitalisation relative to economic activity) suggests that the country is more likely to be integrated into world capital markets[12]. Furthermore, in an important empirical study, Demirguc-Kunt and Levine (1996a) find that large stock markets measured by equity capitalisation to GDP are more liquid, less volatile, more internationally integrated, stronger with regard to information disclosure laws and international accounting standards, and have unrestricted capital flows than smaller markets. While we include this indicator in our analysis, past works by Levine and Zervos (1996, 1998a) suggest that market capitalisation is not a very good predictor of economic performance.

Unlike the past studies, we carefully deflated the indicator statistics. Since the stock market capitalisation is a stock variable measured at the end of a year, while the GDP is a flow variable measured relative or over the year, simply using the stock market capitalisation by the GDP can produce misleading measures of the stock's market development, especially in highly inflationary environments. To address this problem, we used the procedure defined by Levine *et al.*, (2000). Specifically, we deflated the end-of-year stock market capitalisation by the end-of-year consumer price index (CPI) and deflated the GDP series by the annual CPI.

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[12] Morck *et al.*, (2000) and Wargler (2000) also argue that larger markets have more informative prices (due to the more effective arbitrage facilitated by liquidity and low transaction costs) which help investors and managers distinguish between good and bad investments through more accurate measures of stocks.

Then, when we computed the average of the real stock market capitalisation (MC) in year t and t-1 and divided this average by real the GDP measured in year t, the end-of-year CPI is the value for December. The formula is the following:

$$0.5 \times \left\{ \frac{\frac{MC_t}{CPI_{e,t}} + \frac{MC_{t-1}}{CPI_{e,t-1}}}{\frac{GDP_t}{CPI_{a,t}}} \right\} \qquad (5.16)$$

2. Stock Market Volatility

No set of measures of stock market development would be complete without a measure of the volatility of the stock market, because volatility of stock returns is another attribute that has received great attention in the theoretical literature and is of great interest to practitioners. A high level of volatility can lead to a negative future of stock markets in that it can undermine the financial system as a whole[13]. In an efficient market, new information will be correctly and quickly incorporated into price and even though that may entail price jumps, price overshooting and deviations from the equilibrium prices are reduced in efficient markets

Volatility also discourages risk-averse investors and savers, and stock market fluctuations may raise the cost of capital to corporations[14] and may also increase the value of the "*option wait*" hence delaying investments. Volatility would also tend to discourage firms from seeking a stock market listing or attempting to raise funds by new issues. Thus, a high level of market volatility will impede investment and slow overall economic growth (De Long *et al.,* 1989). Garner (1988) and Starr-McCluer (1998) also argue that stock price volatility may adversely affect real economic activity through several possible channels. It may adversely affect consumer spending through wealth and by consumer confidence changes. Further, if extreme stock price volatility causes a financial system crisis, financial intermediation could break down, causing monetary and credit problems in the economic system[15].

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[13] Demirguc-Kunt and Levine (1996a) however argue that greater volatility is not necessarily a sign of more or less stock market development. Indeed, high volatility could be an indicator of development.
[14] See for example Bekaert and Wa (2000), Singh (1992a, 1996, 1997a, 1999), Glen, *et al.,* (2000); Singh, *et al.,* (2000) and Kim and Singal (2000).
[15] This argument is also mentioned by Singh (1999) and Singh *et al.,* (2000).

In order to carry out any empirical study of the relationship between stock market volatility and economic activity, one must first construct a measure of that volatility. Volatility can be measured in many different ways and uses many different frequencies: annual, monthly, or daily volatiles can be calculated. One popular method of calculating unconditional volatiles involves a moving standard deviation of the rate of change of variable. Several papers use this model as a proxy for volatility, for example Officer (1973), Merton (1980) and Levine and Zervos, 1996, 1998a). This model uses either 12 lagged monthly returns, or 6 lagged returns to calculate the standard deviation of returns. One disadvantage of using this method is the ad hoc nature of the choice of the order of the moving standard deviation.

Another approach to constructing volatility measures is to model conditional variance measures. The most widely used model here is the autoregressive conditional heteroscedasticity or ARCH model of Engle (1982). If the stock market returns uncertainty is being proxied by an ARCH model, a possible specification may look like this:

$$\begin{aligned} R_t &= \beta_0 + \beta_1 R_{t-1} + u_t \\ \sigma_t^2 &= h_t + h_1 u_{t-1}^2 \end{aligned} \qquad (5.17)$$

where R_t, is the rate of return at time t; u_t, is the error term at time t; and $u_t \sim N(0, \sigma_t^2)$, is the error term at time t.

Hence, the variance of the error term is conditional on the squared error in the previous time period; the estimated σ_t can be interpreted as a measure of the volatility surrounding the one period change in the stock return between t-1 and t. One problem with this model of measuring volatility is that the modeller must make certain assumptions about the vector of explanatory variables included in both equations. In addition, the proper lag structure of the included variables must be determined. This model may introduce a whole host of mis-specification problems. Also, according to Pagan and Ullah (1988), the use of ARCH as a proxy for risk does not escape the classic errors-in-variables problem, as the "*true*" variable will still be measured with error. Another important problem in implementing the ARCH model is that it typically requires quite a large number of observations for robust estimation (Figlewski, 1997).

Another conditional variance model proposed by Antle (1983) is the linear moment (LM) model. Here the error variance is a function of the regressors used in the regression that specifies the mean of the variable of interest. The main difference between the LM and ARCH method is that the LM model allows the variance to be conditional on past values of explanatory variables, whereas the ARCH models allows the variance to be a function of previous forecast errors.

No method of measuring volatility appears to be greatly superior, since they all have different drawbacks. We have chosen to use the simplest measure of the volatility: the standard deviation of returns. Our reasons for this choice are threefold: ease of computation, ability to match frequency of available data, and its wide use in academic studies[16].

Letting $R_t = \ln(\frac{P_t}{P_{t-1}})$ represent weekly returns on an equity asset, the simplest measure of the volatility of R_t over the period of time t through t+s is the sample standard deviation of return from the recent past. Derivative textbooks commonly recommend this procedure and it is apparently widely used. We calculated the actual annualised standard deviation as a proxy for the annual degree of stock market volatility (v) by using a weekly rate of returns (R) as[17]:

$$v = \sqrt{\left[\left(\frac{1}{N-1}\right) \sum_{i=1}^{N(t)} \left(R_{i,t} - \bar{R}\right)\right]} \qquad (5.18)$$

where $N(t)$ is the number of trading weeks within a year, $R_{i,t}$ is the return on the $i-th$ trading week of the $t-th$ year, and $\bar{R}$ is the mean of the weakly returns during year t.

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[16] One problem with using this procedure, however, is that it is based on assumptions of stability, either constant variance, or constant parameters of the variance process which are unlikely to hold over long periods. In other words, it does not take into consideration one major problem which is that volatility may change over time (time-varying volatility). For a more detailed discussion of the use of this procedure for estimating volatility see Figlewski (1997).

[17] We use weekly data rather than daily data in order to avoid the possibility of the "*thin*" trading problem (noncontinuous trading).

3. Stock Market Liquidity

Liquidity is an important attribute of stock market development because theoretically more liquid stock markets improve the allocation of capital to their optimal use, influence investment in the long term and facilitate technological innovation, thereby enhancing long-term growth[18]. Greater liquidity also has a direct impact on the effectiveness of the governance function of the stock market. First, increased market activity encourages information acquisition, which in turn increases the information content of share prices. Second, the effective use of the stock market for corporate control activities requires that the market be liquid. Takeovers require a liquid capital market where bidders access a vast amount of capital at short notice. Thus, measures of market liquidity may reflect the function of the market for corporate control as well. Therefore, a measure of market liquidity may be a good proxy for information production as well as the monitoring control function of capital markets. Increased stock market liquidity can also reduce the cost of equity capital through a reduction in the expected return that investors require when investing in equity to compensate them for the risks *i.e.*, risk premium (Ahimud and Mendelson, 1986; Ahimud *et al.,* 1997; Henry, 2000a,b)[19].

A comprehensive measure of liquidity would quantify all the costs associated with trading, including the time costs and the uncertainty of finding a counterpart and settling the trade. To measure liquidity, we will use four related measures: turnover ratio and value traded adjusted for the size of the economy (GDP); and the value traded and turnover ratios scaled by the volatility of the stock market[20].

The value traded adjusted for the size of the economy refers to the value of all trades in the stock exchange. This measure is divided by the GDP to adjust for the size of the economy. A

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[18] Miller (1991) argues that liquidity is one of the most important functions that stock markets provide.

[19] Amihud and Mendelson (1986), Brennan *et al.*, (1998) and Chordia *et al.,* (2001) find a negative and significant relationship between expected returns and the level of liquidity measured by trading volume and share turnover.

[20] Another measure of stock market liquidity that is widely used by researchers is the bid-ask spread. Unfortunately, data on bid-ask spread in Jordan is not available. Peterson and Fialkowski (1994) and Dactar *et al.,* (1998) also show that the quoted spread is a poor proxy for the actual transactions costs faced by investors and call for an alternative proxy (turnover rate), which may do a better job of capturing the liquidity of an asset.

higher value traded corresponds to greater liquidity in the market and greater attractiveness for investors. If trading in the market represents the actions of investors buying and selling to attain their desired position, then trading activity measures the speed at which new information is incorporated into prices. The ratio of organised equity trading as a share of GDP positively reflects liquidity on an economy-wide base. This ratio also complements the market capitalisation ratio since the market size measured by market capitalisation be large, but relatively inactive as measured by trading activity. Since both numerator and denominator of this ratio are flow variables measured over the same time period, deflating is not necessary in this case.

The second measure of market liquidity is the turnover ratio. This ratio is equal to the value traded divided by market capitalisation. It measures the size of equity transaction relative to the size of the stock market. High turnover ratio is often used as an indicator of low transaction costs. A higher turnover ratio may represent greater liquidity and market efficiency. Brennan and Subrahmanyam (1996) find that the number of analysts following a stock is strongly positively related to the liquidity of the stocks and that low turnover stocks are followed by fewer analysts and thus are slower to react to information than high turnover stocks. Thus, illiquid stocks react to market information more slowly than do liquid stocks. However, an excessively high turnover ratio may represent inefficiency or excessive speculative trading. The higher turnover ratio in many Asian markets has been attributed to the speculative trading in those markets, which may not represent useful economic activity. Bencivenga *et al.*, (1996) give a model in which excessive liquidity and turnover lower the economic growth rates. Since this indicator is the ratio of a stock and a flow variable, we apply a similar deflating procedure as for the market capitalisation indicator.

It is worth noting here that the turnover ratio complements the earlier cited measure of liquidity, since although markets may be small compared to the size of the economy (as measured by the value traded as a percentage of GDP) they may be liquid. Thus, while an absolute measure of liquidity (such as the value traded as a percentage of GDP) may be indicative of liquidity in the economy as a whole, it may be misleading as a measure of market liquidity if the size of the economy is very large. A classic example is Brazil. In this country

there is not much equity trading relative to the size of the economy (which is large), however, it has a higher turnover ratio reflecting a small but active stock market (Demirguc-Kunt and Levine, 1996a). Consequently, incorporating market size measures by market capitalisation, total value traded as a percentage of GDP, and turnover ratio, provides a more comprehensive picture of stock market development than any single indicator can provide.

Since the liquid stock should support more trading with fewer price movements than the less liquid markets, we use another two measures of stock market liquidity, that are related to the above cited measures. Particularly, the trading-volatility ratio equals the value-traded ratio divided by the stock market volatility and the turnover-volatility ratio equals the turnover ratio divided also by the stock market volatility. One reason why high values of trading-volatility ratio and turnover-volatility ratio are positive indicators of stock market liquidity is that the large value of these ratios indicates a high value of trading relative to the price movements.

However, it is important to note here that the value-traded and trading-volatility ratios have advantages over the other liquidity indicators. Unlike turnover and turnover-volatility ratios, trading-volatility and value-traded ratios have a theoretical motivation for their link with long-term economic growth. Levine (1991), for example, shows that higher transaction costs are associated with a lower value-traded ratio. Bencivenga *et al.,* (1995, 1996), however, show that higher transaction costs which are associated with lower value-traded ratios have an ambiguous effect on savings rates and therefore on economic growth rates.

Another advantage of using value-traded ratio and trading-volatility ratios is that the main purpose of this study is to evaluate whether the liquidity services provided by the stock market are robustly correlated with economic growth. Unlike much of the literature on liquidity that focuses on evaluating whether a stock's liquidity affects its price and rate of return we do not want to measure the degree of liquidity. We want to measure the degree to which the stock market provides liquidity to the Jordanian economy. The stock market may be highly liquid with correspondingly high turnover and turnover-volatility ratios, but it may not be providing significant liquidity to the economy as a whole. Thus, turnover and turnover-volatility ratios may not satisfy our objectives. However, value-traded ratio measures trading relative to the size of the whole economy. Therefore, the value-traded and trading-volatility ratios may

provide more information about the provision of liquidity than turnover and turnover-volatility ratios.

Finally, many researchers argue that trading-volatility and turnover-volatility measures are flawed, because high volatility may not signal illiquidity. The stock markets' volatility may simply reflect the frequent arrival of information irrespective of transaction costs or the volume of trading. The trading-volatility ratio also fails to capture an important component of liquidity that they called "*immediacy*", which reflects how long it takes to find a counterpart to a desired transaction and the risk of information arriving that changes the price before a counterpart is identified (see Grossman and Miller, 1988).

As shown from the above discussion, it is apparent that the value-traded ratio is more closely associated with this study, because, unlike other liquidity indicators, it focuses on economy-wide bases. However, using the value-traded ratio has a potential disadvantage. If the market anticipates large corporate profits, stock prices will invariably rise. This price rise would increase the value of transactions and therefore raise the value-traded ratio. In this case, this liquidity indication would rise without a rise in the number of transactions or a fall in the transaction costs (Levine and Zervos, 1998a). This price also affects the market capitalisation ratio. To avoid the influence of the price effect we need to look at the stock market capitalisation and the value-traded ratio together. If we include both indicators together in the regression and the value traded remains significantly correlated with growth after controlling for the market capitalisation ratio, then this implies that the price effect is not dominating the relationship between the value-traded ratio and growth.

B. The Banking Sector Development Variables

Since a large part of the debate concerns the usefulness of stock markets vis-à-vis banks, the need to understand the independent channels of transmission that both the stock market and the banks sector in Jordan have in the growth process is of paramount importance. A large theoretical literature shows that banks can emerge to lower the costs of acquiring information about firms and lower the costs of conducting transactions[21]. By providing more accurate

[21] See Levine (1997) and Bossone (2000).

information about production technologies, exerting corporate control, managing risk, improving the liquidity of assets variable to savers, and reducing transaction costs, banks can influence resource allocation in ways that may accelerate long-term growth rates (King and Levine, 1993b; and Greenwood and Smith, 1997).

Researchers, however, have not been able accurately to direct measures of the above functions. In this study, we use two indicators of banking sector development that have been used recently by Beck *et al.*, (1999b) and Levine *et al.*, (2000): the ratio of total bank assets to GDP and the value of credit given by the banking sector to the private sector divided by GDP. The first indicator gives evidence of the importance of the financial services performed by the banking sector relative to the size of the economy. While this measure does not distinguish whether the claims of banks are in the public or the private sector, the second indicator concentrates on claims to the private sector[22]. In addition, as pointed out by Levine (1997) "*financial systems that allocate more credit to private firms are more engaged in researching firms, exerting corporate control, providing risk management services, mobilising savings, and facilitating transactions than financial systems that simply funnel credit to the government or state owned enterprises*" (p.705). Recent work shows that private credit exerts a large, positive influence on economic growth. Since both indicators are the ratio of a stock (financial balance sheet item) and flow variable (GDP), we deflated both numerator and denominator, with the numerator equalling the average of the end-of-year value for year t and year t-1, both deflated by the respective end-of-year CPI, and GDP deflated by the annual value of the CPI.

D. The Conditional Information Sets Variables

In order to examine the sensitivity of the results, we experimented with different conditional information sets as suggested by the recent empirical literature on growth[23]. We sought to reduce the chance that the growth regression either omits an important variable or includes a selected group of regressors that yields favourable results. The recent empirical literature on growth has identified a large number of variables that are partially correlated with growth.

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[22] This measure excludes credits issued by the central bank and credits to the public sector.
[23] See for example Barro, 1991; Mankiw, *et al.*, (1992); Levine and Renelt, 1992; Barro and Sala-I-Martin (1995); Beck *et al.*, 1999b; and others.

Both time and technical (the degree of freedom) constraints compel us to limit our conditional variables to the ones most generally used in the literature. We include the inflation rate (based on consumer price index) and the ratio of government expenditure to GDP as indicators of macroeconomic stability[24], and the sum of exports and imports as a share of GDP to capture the degree of openness of the economy[25].

5.5 Data and Summary Statistical Analysis

Whereas the AFM was established in 1978, establishing statistically significant links between its development and economic growth poses data problems: the scarcity of sufficiently long length annual time series. The possible solution to overcoming this problem is by using quarterly frequency data. However, quarterly frequency data on the gross domestic product (GDP) is only available in Jordan since 1992 (unpublished data). It is also well known now that as far as the power of recent time series tests is concerned the span of data is much more important than the number of observations (Campell and Perron, 1991). As suggested by Demetriades and Hussein (1996), it is preferable to use data sets conforming to fewer annual observations over a long time period than data sets containing more observations over a short time period.

Annual time series data are used spanning the period 1978-98, since the establishment of the AFM. Data on macroeconomic variables as well as banking sector variables- per capita GDP, gross domestic product (GDP), investment, government expenditure, consumer price index (CPI), exports and imports, total assets of the banking sector, and the total banks claims on the private sector- are retrieved from annual reports of the CBJ. The data series for the stock market indicators- market capitalisation, value traded, and turnover ratio- are retrieved from annual reports of the AFM. Data on secondary school enrolment rates are from the Yearbook published by the Ministry of Education. Since the annual degree of market volatility is

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[24] Barro and Sala-I-Martin (1995) argue that government expenditure divided by GDP is a good proxy for political corruption, non-productive public expenditure, or taxation.

[25] As discussed by Edwards (1993), the literature on endogenous growth emphasises that economies that are more open to international trade can grow more rapidly by virtue of their larger markets and of becoming more efficient.

computed from a weekly series of stock market returns, we obtained the weekly price index of the AFM over the first of January 1978 to the end of December 1998 from the AFM database. Due to the potential nonlinear relationship between economic growth and the assortment of economic indicators, we use the natural logarithms of the regressors in the growth regressions.

Table (5.1) provides summary statistics for the entire above variables over the sample period used for estimation: 1978-98. As can be seen, the entire variables, except for the inflation rates, do not have significant values of kurtosis and positive/negative skewness. This indicates that these variables do not significantly depart from a normal distribution (values of skewness and kurtosis are 0 and 3 respectively, if the observed distribution is normal).

Jarque-Bera test statistics for the normality is not high either and is insignificant for all variables, except for inflation rates, suggesting that the null hypothesis of these variables conforming to a normal distribution cannot be rejected. The inflation rates show significantly high values of kurtosis (5.82) indicating that for the given level of standard deviations, observations for this variable cluster around a central point with a small number of large outliners. Jarque-Bera test statistics are highly significant suggesting that the inflation rates depart significantly from a normal distribution.

Prior to estimating the relationship between the economic growth and its determinants, it is important to consider whether or not the data are stationary. We tested for stationarity to ensure that the variables used in the regressions are not subject to spurious correlation. The problem of spurious correlations can also emerge when variables are deflated by a stochastic series such as GDP. Phillips (1986) argues that regressions involving non-stationary variables may lead to spurious results showing apparently significant relationships even if the variables are generated independently. We employ the Phillips-Perron test, introduced by Phillips-Perron (1988), to determine the order of integration of the variables of interest. The Phillips-Perron test statistics (PP) are modifications of the Augmented Dickey-Fuller t-statistics (ADF) that take into account the less restrictive nature of the error process. The (PP) test is an attractive alternative to the standard ADF test since the choice of lags in the ADF has been

criticised as arbitrary[26]. The last two columns in Table (5.1) present the results of unit root test for all the variables of interest. The PP tests fail to reject the unit root hypothesis at the five-percent level for all variables in log levels. All variables are I(1). However, the test rejects the null hypothesis of a unit root for each series in first differences. Therefore, it is necessary before estimating the regressions to transform the variables of interest by taking the first differences operator to achieve stationarity[27].

Table 5.1: Summary Statistics

	Mean	Median	Std. Dev	Skewness	Kurtosis	Jarque-Bera	PP in level	PP in 1st Difference
Real Per Capita GDP Growth Rate	0.792	0.621	7.03	-0.233	3.69	0.612 (0.736)	-2.823	-5.631
Secondary School Enrollment Rate	62.90	65.20	6.17	-0.585	1.71	2.65 (0.265)	-2.655	-4.595
Investment Ratio	28.89	29.30	6.45	0.195	2.38	0.458 (0.795)	-1.690	-3.279
Market Capitalisation Ratio	56.98	56.80	14.22	0.450	2.21	1.25 (0.535)	-1.609	-5.004
Value traded Ratio	16.64	15.21	7.22	1.33	3.82	2.822 (0.329)	-2.439	-5.321
Turnover Ratio	20.34	18.14	8.59	1.24	4.54	1.457 (0.240)	-2.338	-5.027
Value Traded Ratio/Volatility	1.00	0.837	0.733	1.384	4.80	1.558 (0.284)	-2.475	-5.549
Turnover Ratio/Volatility	1.61	1.530	1.98	1.2	3.71	4.92 (0.200)	-2.838	-5.915
Volatility	9.93	9.77	1.99	0.052	2.16	0.614 (0.613)	-2.100	-5.987
Banks Asset Ratio	141.7	143.54	42.52	-0.051	1.45	2.109 (0.348)	-0.839	-6.426
Banks Credit Ratio	65.37	68.50	12.47	-0.305	1.95	1.291 (0.524)	-2.627	-3.686
Government Expenditure Ratio	28.66	28.47	2.48	0.05	1.74	1.389 (0.499)	-2.158	-5.397
(Export+Import)/GDP	76.98	78.00	12.81	-0.23	2.23	0.695 (0.795)	-2.309	-5.527
Inflation Rate	7.33	6.5	5.79	1.655	5.82	16.558 (0.0002)	-2.537	-4.391

(P-Value in Parentheses). 1% critical value of PP test is equal –3.830, 5% critical value is equal –3.029 and 10% critical value is equal –2.655.
Notes: Market capitalisation ratio is the market capitalisation divided by the GDP. Value Traded ratio is the total value of the equity transactions divided by the GDP. Turnover ratio is the total of equity transactions divided by the market capitalisation. Volatility is the estimated standard deviation of the stock returns. Bank asset ratio is the total asset of the banking sector divided by the GDP. Bank credit ratio is the ratio of bank claims on private sector to GDP. Government Expenditure ratio is the current government expenditure divided by the GDP.

[26] More detailed information about these tests will be provided in the next chapter.
[27] Another advantage of running the regressions using first differences of the data is to reduce any influence of multicollinearity, thus improving the robustness of the estimation results.

Table (5.2) presents the correlation among the variables. The first number is the correlation; the second number is the P-value (a value of less than 0.05 indicates that the correlation is significant at the five-percent level). As can be seen, all stock market development indicators are significantly correlated with growth (per capita real GDP growth). The stock market capitalisation and all liquidity measures, the value traded, turnover, trading-volatility, and turnover-volatility ratios, are positively and significantly correlated with growth at the five-percent level. The volatility measure is also significantly but negatively correlated with growth. The ratio of total bank assets to GDP is positively but insignificantly correlated with growth. The ratio of bank claims on the private sector to GDP highly positively and significantly correlated with growth.

The correlations among the stock market development indicators show us three important points. First, the four measures of market liquidity: the value traded, turnover, trading-volatility and turnover-volatility ratios, are significantly and positively correlated, the correlation coefficient is greater than 70 percent. The conclusion is that the four measures are substitutes and may reveal similar aspects of stock market development. Second, the stock market size indicator- the market capitalisation- is significantly positively correlated with the liquidity indicators, and negatively correlated with the volatility measures. This leads to the conclusion that when the size of the stock market increases, the stock market becomes more liquid and efficient. Thus, our data set confirms the finding of Demirguc-Kunt and Levine (1996a) that large stock markets measured by equity capitalisation to GDP are more liquid and less volatile. Finally, liquidity, volatility and market capitalisation are significantly correlated; the correlation coefficients among these variables are below 0.50 on average. This suggests that different indicators capture different aspects of stock market development. For example, while market capitalisation may capture the ability of the stock market to mobilise capital and hedge risk, the market liquidity may reveal the information production and governance functions of the stock market.

Table 5.2: Correlation Among Variables

	GROWTH	INVES	EDUC	MCR	VTR	TOR	VTR/VOL	TOR/VOL	VOL	BAR	BCR	GER	INF	TRAD
GROWTH	1.000 .	0.519 (0.000)	-0.014 (0.464)	0.448 (0.001)	0.592 (0.000)	0.526 (0.000)	0.338 (0.036)	0.438 (0.043)	-0.133 (0.199)	0.110 (0.244)	0.638 (0.000)	-0.333 .(0.029)	-0.614 (0.000)	0.371 (0.022)
INVES	.	1.000 .	0.024 (0.440)	0.308 (0.026)	0.441 (0.003)	0.337 (0.017)	0.0433 (0.003)	0.327 (0.020)	-0.077 (0.314)	0.152 (0.210)	0.406 (0.003)	-0.087 (0.293)	-0.173 (0.138)	0.258 (0.058)
EDUC			1.000 .	0.138 (0.190)	0.077 (0.314)	0.062 (0.347)	0.110 (0.244)	0.148 (0.174)	-0.282 (0.037)	(0.153 (0.167)	0.263 (0.048)	0.100 (0.263)	0.129 (0.207)	0.138 (0.190)
MCR				1.000 .	0.661 (0.000)	0.557 (0.000)	0.467 (0.002)	0.314 (0.023)	-0.271 (0.043)	0.310 (0.030)	0.562 (0.000)	-0.229 (0.074)	-0.386 (0.293)	0.019 (0.452)
VTR					1.000	0.743 (0.000)	0.924 (0.000)	0.667 (0.000)	-0.462 (0.003)	0.242 (0.041)	0.520 (0.000)	0.139 (0.190)	-0.053 (0.370)	0.062 (0.347)
TOR						1.000 .	0.781 (0.000)	0.857 (0.000)	-0.410 (0.004)	(0.233) (0.046)	0.495 (0.001)	0.200 (0.102)	-0.019 (0.452)	0.029 (0.428)
VTR/VOL							1.000 .	0.752 (0.000)	-0.795 (0.000)	0.281 (0.052)	0.467 (0.001)	0.210 (0.092)	-0.010 (0.476)	0.057 (0.359)
TOR/VOL								1.000 .	-0.733 (0.000)	0.219 (0.072)	(0.562) (0.001)	0.229 (0.074)	-0.010 (0.476)	0.057 (0.359)
VOL									1.000 .	-0.124 (0.154)	-0.395 (0.003)	0.086 (0.293)	0.171 (0.138)	0.029 (0.428)
BAR										1.000 .	0.692 (0.000)	0.415 (0.004)	-0.110 (0.244)	0.301 (0.029)
BCR											1.000 .	0.286 (0.035)	-0.386 (0.003)	0.248 (0.058)
GER												1.000 .	0.333 (0.004)	0.219 (0.082)
INF													1.000 .	-0.210 (0.092)
TRAD														1.000 .

Notes: (P-Value in Parentheses).
Growth is the real per capita GDP growth. INVES is the value investment as percentage of GDP. EDUC is the secondary school enrolment rate. MCR is the stock market capitalisation ratio VTR is the value-traded ratio. TOR is the turnover ratio. VTR/VOL is the value-traded ratio divided by volatility. TOR/VOL is the turnover ratio divided by volatility. BAR is the total banking sector asset to GDP. BCR is the value of banks loans to private enterprises divided by GDP. GER is the government expenditure divided by GDP. INF is the inflation rate. TRAD is the sum of imports and exports divided by GDP.

As can also be seen from Table (5.2), there are strong correlations between bank sector development indicators and stock market development indicators. A possible explanation of this correlation is that the stock market transmits information that is useful to creditors. Prices quoted on the stock market at least partially reveal information that more informed investors possess. This revelation of information may make lending to a publicly quoted firm less risky. As a result, greater development in the stock market may increase the ability of firms to obtain credit and encourage banks to provide more credit[28].

5.6 The Empirical Results

The results obtained from the TSLS estimation in our regressions are summarised in Table (5.3) and (5.4)[29]. It is important to note before analysing the results that all regressions estimated in the first differences to achieve stationarity. To avoid misspecification of the estimated regressions, two dummy variables have been included to account for large outliers in per capita real GDP growth in 1989 and 1992[30].

Regression 1 represents the basic regression, where its explanatory variables appear in all regressions thereafter. The dependant variable is the economic growth proxied by the per capita real GDP growth. The secondary school enrolment rate, the investment ratio, and the stock market development indicator as proxied by the market capitalisation (adjusted for the GDP), are the explanatory variables[31]. As can be seen, the regression explains about 48.77 percent of the variation in measuring the economic growth of Jordan. The F-statistics for the regression, F=6.161, reject the null hypothesis of no explanatory power for the regression as a whole at the one-percent level. The test of residuals shows some interesting information. The Lagrange Multiplier test of residual serial correlation accepts the null hypothesis of no autocorrelation. In addition, there appears to be no significant autoregressive conditional

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[28] Thus, our preliminary results confirm the finding of Levine and Zervos (1996, 1998a), Demirguc-Kunt and Levine (1996a), and Garcia and Liu (1999) that banking sector development and stock market development are complements rather than substitutes.
[29] We used one-lag value of explanatory variables as instruments in the TSLS estimators.
[30] See Chapter II.

heteroscedasticity ARCH using 9 lags. And the heteroscedasticity test based on the White test, involving an auxiliary regression of the squared errors, the original regressors and their squares, could not reject the null of homoscedasticity. The statistical test of the skewness of the residuals corresponds to that of a normal distribution. Finally, a regression specification test or RESET test rejected the null of correct specification of this model at the five-percent level. This provides evidence that the regression estimated in column 1 is not appropriate here and that a research for alternative specification is warranted.

The individual coefficients on the regression enter with the appropriate signs. The proxy for the human capital stock, the secondary school enrolment rate, enters positively, but not statistically significant at the ten-percent level[32]. Furthermore, it does not show up as statistically significant in all regressions thereafter [33]. This could be explained by reference to the fact that Jordan suffers from high level of unemployment especially the structural one in which there is a mismatch between the output of the education system and the needs of the economy.

The importance of the investment proxied by gross capital formulation adjusted by GDP is emphasised by the strongly positive and statistically significant (at the one-percent level) relationship that it exhibits with economic growth[34]. A one-percentage point increase in the growth rate of investment to GDP is associated with a 0.46 percentage point increase in the per capita real GDP growth. This result is consistent with the theoretical view[35]. Economic theory holds that higher rates of savings and investment are essential to the long-run rate of

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[31] All the regressions equations in this section were also re-estimated including the lagged growth rate of real per capita GDP as explanatory variable, to control for the component of growth predicted on the basis of lagged growth. The results (not reported) are essentially unchanged and similar to the results reported below.

[32] This result is consistent with (many) growth studies that have found no or very limited effects of human capital on growth (see for example, Benhabib and Spiegel (1994) and Barro and Sala-I-Martin (1995).

[33] We also used another three alternative variables proxies for human capital: primary school enrolment rate, the total average schooling years and the growth of the working age population. Similarly, we failed to find any significant relationship between any of these variables and the growth of real per capita GDP.

[34] This result is consistent with the findings in Sinha and Tapen (1999). They study the effects of growth of openness and investment on the growth of GDP in 15 countries including Jordan. They find the coefficient of the growth of domestic investment in Jordan is highly positive and significantly different from zero at the one-percent level. It is also consistent with the findings in Maghyereh (1993), who studies the effect of private investment on economic growth in Jordan.

[35] And also with empirical evidence that high output growth is associated with high investment rates (see for example, Fielding, 1997; and Bassanini *et al.*, 2001).

growth of a country. The suggestion behind Solow's (1956) framework is that higher investment over savings rates lead to more accumulated capital per worker, resulting in an increase in per capita output, but at decreased rates. Under endogenous growth theory with an emphasis on broader concepts of capital, such as that of Rebelo (1991), per capita real GDP growth and investment ratio tend to move together. The high significance of the total investment coefficient may reflect the effects of embedded technological change on aggregate supply working through the new investments. It will be noted that in the time period under consideration 1978-98 Jordan's economy has been transformed from a mainly agrarian-based economy to services- and industrial-based economy dominated by tourism, construction, mining and manufacturing sectors. This structural change required a persistent process of installation of new capital goods, construction and machinery that change supply capacity enormously.

The most important result in this regression is that the stock market indicator as proxied by the market capitalisation adjusted for the GDP enters a highly significant (at the one-percent level) positive correlation with economic growth. A one-percentage point increase in the growth rate of market capitalisation to GDP is associated with a 0.242 percentage point increase in per capita real GDP growth[36]. This result is not surprising; it is consistent with the importance of the stock market in mobilising capital to the Jordanian economy during the period under consideration. As we have shown in Chapter III, the new issues on the stock market have been important in terms of financing a considerable proportion of the private sector investment in Jordan especially during the late 1998s and the 1990s.

This favourable result gives rise to two basic questions: First, is this result "*robust*" *i.e.* does the inclusion of other variables that are known to influence growth negate the significance of the stock market indicator as proxied by the market capitalisation? Second, does the stock market capitalisation as an indicator of the stock market development exert an independent channel of influence? Or does it merely capture the explanatory power of another variable, say for example the banking sector?

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[36] This result is inconsistent with the findings in Levine and Zervos (1996, 1998a). They find results suggest that market capitalisation is not a very good predictor of economic growth.

In denying the importance of stock markets to the growth process, economists have levied two kinds of charge. There are those who believe that those financial factors are not important to the growth process. An increase in new models in the theoretical literature and a wide body of evidence in the empirical literature are emerging to refute that claim. However, even for those who do acknowledge that financial factors are important in the growth story, they are still sceptical as to the role of stock markets in promoting growth. These researchers are of the opinion that banks are relatively adequate for providing credit, liquidity and risk management and the other markets are not important in the financial intermediation story.

The thereafter regressions in Table (5.3) answer all the above questions and attempt to refute the claims of such economists. To test the importance of the stock market vis-à-vis banks in Jordan, we included proxies for both the stock market and the banking sector development in the same regression. In regression 2, in addition to the base regression variables, we included the banking sector development indicator-proxied by the total banks assets to GDP, to measure the role of the banking sector in the economic growth process. All the fixed variables enter with anticipated signs and similar levels of statistical significance as in regression 1, while the banking sector development indicator enters positively but not statistically significantly (at the ten-percent level). There are two possible interpretations of this result. When one is looking at the balance sheet of Jordanian banks one finds foreign assets (balance with foreign banks) accounting for more than 30 percent of the total assets, and the cash in vaults and deposits with the CBJ accounting for more than 10 percent. The conclusion is that more than 40 percent of the total assets of the Jordanian banks are not utilised in the local economy. Another reason is that the largest locally based commercial bank, the Arab Bank[37], which caters mainly for Palestinians throughout the world, is playing a modest role in the local economy and not on a par with its size.

The interesting result from equation 2 is that after controlling the indicator of the banking sector development, the stock market development as proxied by the market capitalisation/GDP remains positively and significantly correlated (at the one-percent level)

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[37] A Palestinian institution that moved to Amman from Jerusalem in 1948.

with economic growth. The fit of regression with an R^2 of 51.9 percent is in close approximation with the results obtained from regression 1. However, the F-statistic for the regression declined to 4.045, but still rejects the null hypothesis of no explanatory power of the regression a as whole at the five-percent level. The test of residuals shows that the regression is quite similar to the initial one. There is no significant autocorrelation, heteroscedasticity or ARCH in the residuals. The RESET test, as regression 1, rejects the null of no functional form mis-specification at the five-percent level.

Regression 3, in addition to the variables which were included in regression 2, includes other conditioning variables commonly included in literature, the government expenditure (current)/GDP, export plus import/GDP, and the inflation rate. The results further validate the results obtained from the previous regressions. All the fixed variables enter as anticipated in regressions 1 and 2. Government expenditure as a percentage of GDP enters negatively but not statistically significantly at the ten-percent level[38]. The explanation of this result can be found in the supply side theorists since the Jordanian budget revenue is based mainly on taxes (direct and indirect)[39]. These theorists argue that taxes required for financial government expenditures distort incentives and reduce efficient resource allocation and the level of output[40].

The effect of the growth of openness, as measured by the ratio of export plus import to the GDP, is positively and statistically significantly correlated (at the five-percent level) with economic growth[41]. The implication of this is that an increase in the value of exports and imports relative to the GDP of the country increases its economic growth. Exports can affect economic growth through two channels. First, although industrialisation is critical to economic growth, the domestic demand is low. Exports provide an outlet for this excess production and generate income. Second, in the long-term, exports help growth because exports tend to gather technical progress and more savings. Also, they improve the credit rating of the country by

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[38] This result is consistent with many empirical studies see for example Barro and Sala-I-Martin (1995); Bailliu (2000); and Bassanini *et al.*, (2001).
[39] The total taxes revenue (direct and indirect) in Jordan accounted for 60 percent of the current expenditures, and for 15 percent of the GDP in 1998.
[40] See Leibfritz *et al.*, (1997) for a comprehensive survey on the link between taxation and economic performance.
[41] This result is consistent with findings in Bloom and Malaney (1999); Bailliu (2000); Bassanini *et al.*, (2001); and others.

Table 5.3: Stock Market Development and Growth: Per Capita Real GDP Growth as a Function of Market Capitalisation Ratio

	1	2	3	4	5
Constant	1.084 (0.249) {1.211}	0.877 (0.432) {0.816}	0.848 (0.576) {0.580}	0.584** (0.049) {2.146}	0.350** (0.054) {2.113}
Secondary School Enrollment Rate	0.037 (0.375) {0.911}	0.0305 (0.716) {0.486}	0.0091 (0.845) {0.198}	0.0314 (0.689) {0.419}	0.0069 (0.857) {0.1877}
Investment Ratio	0.464* (0.004) {3.607}	0.439* (0.006) {3.358}	0.496* (0.007) {3.283}	0.580* (0.001) {4.278}	0.534* (0.001) {5.220}
Stock Market Development Indicator	0.2428** (0.043) {2.201}	0.217* (0.006) {3.372}	0.201** (0.023) {2.729}	0.1763** (0.017) {2.697}	0.1794* (0.012) {2.896}
Banking Sector Development Indicator		0.182 (0.548) {0.615}	0.106 (0.475) {0.746}	0.492* (0.007) {3.011}	0.4203** (0.027) {2.495}
Government Expenditure Ratio			-0.173 (0.234) {-1.266}		-0.349 (0.260) {-1.192}
(Export+Import)/GDP			0.142** (0.042) {2.382}		0.210** (0.066) {2.043}
Inflation Rate			-0.452** (0.0462) {-2.012}		-0.395** (0.027) {-2.590}
R^2	0.487	0.519	0.711	0.645	0.851
R^2-adjusted	0.416	0.402	0.629	0.578	0.721
DW	1.766	1.653	1.666	1.849	1.457
F-Statistics	6.162*	4.045**	4.224**	6.832*	9.804*
χ^2 sc (1)	(0.426)	(0.684)	(0.831)	(0.457)	(0.641)
χ^2 *ff* (1)	(0.035)**	(0.044)**	(0.283)	(0.141)	(0.289)
χ^2 n (2)	(0.732)	(0.746)	(0.943)	(0.703)	(0.968)
χ^2 h (1)	(0.592)	(0.766)	(0.544)	(0.438)	(0.604)
ARCH (9)	(0.420)	(0.276)	(0.342)	(0.447)	(0.326)
PP (3)	-3.698**	-3.937*	-4.099*	-3.660**	-4.062*

{Heteroscedasticity-consistent t-statistics in brackets} (P-values in parentheses).

* significant at the 1% level, ** significant at the 5% level, *** significant at the 10% level.

The sample period is 1978-98. R^2 adjusted is the usual R^2, adjusted for the degrees of freedom; DW is the Durbin-Watson test for residual serial correlation. The F-test tests the null hypothesis that all coefficients except for the intercept are zero. The reported misspecification tests are conducted to test a number of null hypotheses on the residuals for the regression. These tests are χ^2 sc (1), χ^2 *ff* (1), χ^2 n (2), χ^2 h (1), ARCH (ρ) which are defined respectively as follows: χ^2 sc (1) = Serial correlation; Lagrange multiplier test of residual serial correlation. χ^2 *ff* (1) = Functional form; Ramsey's Reset test using square fitted values. χ^2 n(2) = Normality, based on a test of skewness and kurtosis of residual. χ^2 h(1) = Heteroscedasticity, based on a regression of squared residual on squared fitted values. ARCH (ρ) = Autoregressive conditional heteroscedasticity test. Finally, PP (ρ) is residual-based Phillips-Perron test of cointegration.

Notes: investment ratio is the volume of gross capital formulation divided by GDP. Stock market indicator is the market capitalisation divided by GDP. Bank indicator in regressions 2 and 3 is the total banking sector assets divided by GDP, in regression 4 and 5 is the ratio of banking sector claims to the private sector to GDP. Government expenditure ratio is total government current expenditure divided by GDP.

generating hard currency and thus make obtaining foreign loans easier. Imports also help the country. Imports of capital goods and energy can help economic growth if they are used efficiently[42].

The effects of the inflation rates enter strongly negatively and statistically significantly at the five-percent level. This result is consistent with certain theoretical and empirical views[43]. The negative and high significant coefficient of this variable (0.423) is explained by reference to the fact that for the most of the period 1978-98 there has been sustained high inflation in Jordan. High inflation could be associated with inflation uncertainty, that is, increased uncertainty regarding future inflation. For the economy to function efficiently, economic agents require clear signals from markets when making decisions regarding consumption and investment because these decisions are largely dependent on the formation of expectations regarding prices. However, inflation uncertainty causes the real value of future payments and earnings to be uncertain, and could thereby distort agents' decisions regarding investment and consumption[44]. Inflation also discourages long-term lending by financial intermediaries, which reduces the investment rate.

The most important result from regression 3, however, is that even after controlling for other known influences on economic growth and the indicator of the banking sector development, *i.e.* stock market development, retains the same signs and level of significance as in regression 2. The banking asset ratio remains positively and statistically insignificantly correlated (at the ten-percent level) with economic growth. The market capitalisation ratio also remains positively and significantly correlated (at the five-percent level) with economic growth. Although, as can be seen, inclusion of the other conditioning variables improves the overall fit of the regression (R^2 rises from 51.9 percent in regression 2 to 71.1 percent in regression 3).

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[42] This explanation is consistent with the fact that Jordan's imports during the period under consideration have been dominated by capital and machinery goods as well as raw materials (accounted for about 70 percent of total value of the county's imports) all imported for the purpose of capital formulation and expanding potential aggregate output. Coe and Helpman (1995) find that countries with a higher import propensity have a higher productivity growth.

[43] See for example, Temple (1999); Khan and Senhadji (2000); Bassanini *et al.*, (2001); and others for empirical evidences and Dotsey and Sarte (2000) for theoretical explanations.

[44] In fact, a high inflation rate encourages speculative, less-productive or non-productive investment in land and real estate, and discourages long-term and illiquid investment projects, thereby having a negative effect on economic growth.

The F-statistics from the regression, F=4.22, also reject the null hypothesis of no explanatory power for the regression as a whole at the five-percent level. Residual autocorrelation, heteroscedasticity and ARCH are not significant. More importantly, functional form mis-specification from the RESET test is no longer a significant problem.

In regressions 4 and 5, the variables are similar to those included in regressions 2 and 3, but we replaced the banks asset ratio as indicator for the banking sector development with the ratio of total banks claims to the private sector to GDP. In regression 4, the stock market development indicator continues to remain positively and significantly correlated (at the five-percent level) with economic growth[45]. The banking sector development indicator, the ratio of banks claims to private sector to GDP, enters strongly positively and statistically significantly (at the five-percent level). This result indicates that the ratio of banks claims to private sector to GDP is a better measure of banking sector development and a better predictor of growth than the banks asset ratio. As argued by Beck *et al.*, (1999b) and Levine *et al.*, (2000), the ratio of banks claims to private sector to GDP has a clear advantage over measures of banks asset ratio, in that it more accurately represents the actual volume of funds channelled into the private sector.

It should be noted that the coefficient of the banking sector development indicator (0.49) is larger than the coefficient of the stock market development indicator (0.17), suggesting that the banking sector development has a bigger effect on economic growth than stock market development. A one percentage point increase in the growth of banks lending to private sector to GDP is associated with a 0.492 percentage point increase in the per capita real GDP growth, while a one percentage point increase in the growth rate of market capitalisation to GDP is associated with a 0.176 percentage point increase in the per capita real GDP growth. This result may simply reflect the translation ratio between market capitalisation and eventual finance through new share issues. Unlike a JD of credit, a JD of market capitalisation does not necessarily mean that some firm obtained a JD of finance (Rajan and Zingels, 1998). This result also may indicate that the banking sector is more important for the real growth than the stock market in Jordan. This implication seems to be consistent with some studies reviewed in

[45] This result is consistent with the findings in Levine and Zervos (1996, 1998a).

this study. For an emerging economy without mature entrepreneurial experience, banks will be relatively more important. This argument seems to be applicable to Jordan during the early part of the period under study.

The regression summary statistics and the test of residuals show a significant improvement over regression 2. The fit of this regression, with an R^2 of 74.5 percent is better than that obtained by regression 2, where the banking sector development was proxied by the total bank asset to the GDP. The F-statistics of the regression, F=6.832, are also improved, which rejects the null hypothesis of no explanatory power for the regression as a whole at better than in the one-percent level. Residual autocorrelation, heteroscedasticity and ARCH are not significant, and functional form mis-specification is no longer a significant problem. More importantly, this result answers the first question posed above. It is consistent with the view that the banking sector and stock market provide different bundles of services to the nonfinancial sectors. If they provided the same financial services, then they would not both enter the growth regression significantly. A possible explanation of this result is that banks primarily ameliorate information asymmetries, while stock markets primarily enhance liquidity and facilitate risk diversification[46].

After including the other conditioning variables in regression 5, the results further validate the results obtained from regression 4. All the fixed variables enter with the anticipated signs and similar levels of statistical significance to all the previous regressions. The conditioning variables also enter with the anticipated signs and similar levels of statistical significance to those in regression 3. The interesting result, however, is that the stock market and banking sector development indicators remain positively and significantly correlated with economic growth. Furthermore, the coefficient of the bank development indicator is stronger in magnitude than that of the stock market indicator. The fit of this regression with an R^2 of 85.1 percent is better than that obtained in all previous regressions. There are also significant improvements in the F-statistics, F=9.804, rejecting the null hypothesis of no explanatory power for the regression as a whole at better than at the one percent level. Again notice the

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[46] However, well-functioning stock market may create incentives that reduce information asymmetries, and banks may enhance liquidity as shown by Diamond and Dybvig (1983). Thus, we need a comprehensive theory in

improvement in residual test statistics. Residual autocorrelation, heteroscedasticity, ARCH and functional form mis-specification from the RESET test are not significant.

Based on the above results, we shall offer only this conclusion at present: the stock market is not unimportant in the Jordanian growth process. Moreover, it offers an independent channel of transmission to growth by providing an array of services that complement the other components of the financial system *i.e.* the banking sector[47].

While we have empirically established the link between the stock market and the economic growth of Jordan, the entire analysis is based on the single stock market development indicator, the market capitalisation ratio. To test the "*robustness*" of our results, we tested whether our results are particular to the choice of the stock market development indicator or whether the various proxies that capture different faces of the level and the degree of the stock market give similar conclusions.

The question then is "*are the various other proxies of the market development also correlated with the economic growth of Jordan*?" Regressions 6-10 of Table (5.4) attempt to answer this question. In these regressions, the stock market development is proxied by the total value-traded ratio, turnover ratio, trading-volatility ratio, turnover-volatility ratio, and volatility, respectively. Since the total banks assets ratio appeared insignificantly correlated with economic growth in regressions 2 and 3, we have replaced this indicator with the ratio of banks claims on private sector to GDP as a proxy for the banking sector development in all these regressions.

As is evident from Table (5.4) in each of the cited regressions, the indicator for the stock market development, except the market volatility, is statistically significantly correlated with economic growth. As can be seen from regressions 6-9, all liquidity indicators enter positively and statistically significantly (at the five-percent level) correlated with economic growth.

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which stock market and banks both arise, prosper, and provide services to the economy that are positively and independently associated with future long-run economic growth.

[47] This result is consistent with the framework provided by Boyd and Smith (1998).

Table 5.4: Stock Market Development and Growth: Per Capita Real GDP as a Function of Other Proxies for Stock Market Development

	6	7	8	9	10
Constant	0.387** (0.028) {2.550}	0.376** (0.048) {2.138}	0.3920** (0.037) {2.507}	0.3106** (0.056) {2.111}	0.339** (0.053) {2.139}
Secondary School Enrollment Rate	0.0268 (0.476) {0.732}	0.0055 (0.887) {0.155}	0.0315 (0.573) {0.587}	0.0411 (0.338) {0.912}	0.0510 (0.6060 {0.529}
Investment Ratio	0.480** (0.030) {2.522}	0.387** (0.0416) {2.265}	0.353** (0.039) {2.342}	0.341** (0.026) {2.532}	0.3873* (0.016) {3.017}
Stock Market Development Indicator	0.0632** (0.025) {2.485}	0.0597** (0.022) {2.789}	0.069** (0.045) {2.326}	0.0504** (0.0362) {2.672}	-0.063 (0.331) {-1.123}
Banking Sector Development Indicator	0.4679* (0.008) {3.262}	0.4800* (0.011) {2.978}	0.5135* (0.006) {3.233}	0.4584* (0.001) {3.127}	0.4498* (0.010) {3.322}
Government Expenditure Ratio	-0.401 (0.263) {-1.136}	-0.437 (0.509) {-0.679}	-0.391 (0.549) {-0.616}	-0.515 (0.330) {-1.147}	-0.569 (0.270) {-1.156}
(Export+Import)/GDP	0.197 (0.216) {1.306}	0.154*** (0.113) {1.796}	0.176 (0.157) {1.605}	0.166 (0.392) {0.867}	0.216 (0.156) {1.579}
Inflation rate	-0.364** (0.006) {-3.291}	-0.494** (0.032) {-2.419}	-0.429** (0.031) {-2.442}	-0.596** (0.015) {-2.852}	-0.477* (0.003) (-4.275)
R^2	0.905	0.918	0.939	0.902	0.8103
R^2-adjusted	0.841	0.852	0.879	0.824	0.7257
DW	1.566	2.027	1.837	2.027	2.037
F-Statistics	16.365*	16.600*	26.405*	15.790*	7.323*
χ^2 se (1)	(0.632)	(0.577)	(0.504)	(0.502)	(0.509)
χ^2 *ff* (1)	(0.336)	(0.322)	(0.350)	(0.384)	(0.181)
χ^2 n (2)	(0.864)	(0.868)	(0.929)	(0.928)	(0.892)
χ^2 h (1)	(0.678)	(0.573)	(0.547)	(0.565)	(0.452)
ARCH (9)	(0.461)	(0.4731)	(0.468)	(0.402)	(0.647)
PP (3)	-3.883*	-4.036*	-3.893*	-3.978**	-4.481*

{Heteroscedasticity-consistent t-statistics in brackets} (P-values in parentheses).
*significant at the 1% level, ** significant at the 5% level, *** significant at the 10% level.
The sample period is 1978-98. R^2 adjusted is the usual R^2, adjusted for the degrees of freedom; DW is the Durbin-Watson test for residual serial correlation. The F-test tests the null hypothesis that all coefficients except for the intercept are zero. The reported misspecification tests are conducted to test a number of null hypotheses on the residuals for the regression. These test are χ^2 sc (1), χ^2 *ff* (1), χ^2 n (2), χ^2 h (1), ARCH (ρ) which are defined respectively as follows: χ^2 sc (1) = Serial correlation; Lagrange multiplier test of residual serial correlation. χ^2 *ff* (1) = Functional form; Ramsey's Reset test using square fitted values. χ^2 n(2) = Normality, based on a test of skewness and kurtosis of residual. χ^2 h(1) = Heteroscedasticity, based on a regression of squared residual on squared fitted values. ARCH (ρ) = Autoregressive conditional heteroscedasticity test. Finally, PP (ρ) is residual-based Phillips-Perron test of cointegration.
Notes: investment ratio is the volume of gross capital formulation divided by GDP. Stock market indicator in regressions 6-10 is the value-traded ratio, turnover ratio, trading-volatility ratio, turnover-volatility ratio and volatility, respectively. Banking sector development indicator is the ratio of total banks claims on private sector to GDP.

Besides being statistically significant the estimated coefficients suggest that the relationship between stock market liquidity and growth is economically large. The estimated coefficient on value-traded ratio implies that with an increase of a one-percentage point in the growth rate this variable would increase economic growth by 0.063-percentage point. The estimated coefficient of turnover ratio also suggests a similarly large economically relationship between stock market liquidity and economic growth. Specifically, an increase of a one-percentage point in the growth rate of turnover ratio would increase economic growth by 0.026-percentage point. The other two indicators of stock market liquidity- trading-volatility and turnover-volatility ratios- also confirm the above results. In regressions 8 and 9, we replaced the trading value and turnover ratios with trading-volatility and turnover-volatility ratios, respectively. Again, these liquidity indicators enter positively and statistically significantly (at the five-percent level). And the coefficients estimated are approximately similar to that estimated for the value trading and turnover ratios in regressions 6 and 7.

The "*price-effect*"- a change in the value-traded and market capitalisation ratio due purely to a change in stock prices- does not drive the strong link between liquidity and economic growth. This can be derived from two results. First, both the value-traded and turnover ratios are significantly correlated with economic growth. This implies that increases in stock prices are not driving the liquidity results. Second, when the market capitalisation and value-traded ratios are simultaneously included in the regression growth, both remain enter significantly correlated with economic growth with little change in the estimated coefficients[48]. This implies that changes in the stock prices are not driving the results on the value-traded, since both the market capitalisation and the value-traded ratio influence by the price changes. If the price effects were driving the value-traded results, then both indicators would not enter significantly correlated with the growth. Therefore, the evidence is consistent with the view

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[48] Specifically, when the market capitalisation and value traded ratio are simultaneously included in the growth regression with other conditioning variables, the following results are obtained:

Growth= 0.328 + 0.046 (Secondary School Enrollment Rate) + 0.482 (Investment ratio) + 0.189 (Market Capitalisation) + 0.069
(0.053) (0.909) (0.015) (0.026) (0.015)
{2.325} {0.118} {2.929} {2.613} {2.538}
(Value Traded Ratio) – 1.228 (Government Expenditure Ratio) + 0.04 (export+import/GDP) –0.587 (Inflation Rate)
(0.8006) (0.824) (0.017)
{-0.154} {0.227} {-2.845}

with an R^2 of 0.886, R^2-adjusted = 0.745, DW=1.744, and F-statistics=8.379*, χ^2 se (1) = (0.457), χ^2 *ff* (1) =(0.324), χ^2 n (2) = (0.946), χ^2 h(1) = (0.602), ARCH (9) = (0.365). PP (3) =-3.842*. Where the p-values are in parentheses, and t-statistics in brackets.

that the ability to trade ownership of an economy provides technologies, which easily promote more efficient resources allocation, capital formulation and accelerate economic growth.

An interesting result, however, is obtained from regression 10. In this regression stock market volatility enters negatively but not statistically significantly (at the ten-percent level) correlated with the economic growth[49]. This result can be explained by reference to the fact that during the period of consideration Jordan's stock market has exhibited stable and low level of volatility in its stock returns.

As is evident from Table (5.4) also, in each of the above-cited regressions, the banking sector development indicator proxied by the ratio of bank claims on private sector to GDP enters statistically significantly (at the one-percent level) correlated with economic growth. This result confirms the fact that both the banking sector and the stock market are important in the growth process of Jordan. The result also validates the argument that the stock market performs a different set of functions not provided entirely by the banking system.

The fit of the regressions in Table (5.4) with an R^2 greater than 80 percent is relatively satisfactory. The F-statistics in each of the cited regressions reject the null hypothesis of no explanatory power for the regression as a whole better than at the one-percent level. In addition, all residual tests are insignificant.

From the results shown above a clear picture arises. First, we confirm the finding that stock market development indicators are robustly correlated with economic growth even when including other variables that affect economic growth. Second, the results indicate that if we include the banking sector development indicator, the stock market development remains an important determinant; this implies that the stock market and the banking sector are complementary rather than substitutes for each other in financing economic growth in Jordan. The third observation is that we need to be careful with the statement that stock market development is crucial to economic growth. Our results till now confirm the view that there is

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[49] This result is consistent with the findings in Levine and Zervos (1996, 1998a). They find that stock market volatility is positively but not statistically significantly correlated with growth.

a strong relation between economic growth and the stock market development and this relation is due not merely to a simultaneity bias. In other words, the findings merely suggest that there is an exogenous component of stock market development that positively influences economic activity. Two main equations still need to be addressed. Is the stock market a leading sector in the process of economic development of Jordan? Or it is a two-way direction?

5.7 Summary and Conclusion

In this chapter we have provided a simple theoretical framework that links together the endogenous growth theory and the current theory on functions of financial markets and institutions, in order to study how financial markets development affects economic growth. In this framework we identified three mechanisms by which financial development may encourage endogenous economic growth: (1) financial markets can encourage a more efficient allocation of new investment-additions to capital stock from relatively less to relatively more productive uses by intermediation between savers and entrepreneurial investors; (2) financial markets can induce an increase in the rate of accumulation of capital by providing increased incentives to save and invest; and (3) financial markets can improve productivity of capital by providing an important function in controlling and monitoring managerial actions. We have argued that the degree to which the stock market influences real economic growth depends on how effectively it provides liquidity bands, risk sharing and pooling, information and monitoring functions. Then we extended a model of the Romer (1986), Lucas (1988), Rebelo (1991), and Pagano (1993a) type of endogenous growth economy in order to incorporate the effect of stock market development.

We attempted to investigate empirically the strength of the independent correlation between stock market development and economic growth in the small, developing country of Jordan. Given the still incomplete state of the data and the tentative, simple econometric testing done, the conclusions reached in this chapter can only be regarded as provisional and as providing us with preliminary answers to our questions. However, this is the first study to incorporate such an a broad array of indicators to measure individual stock market development in a small developing country like Jordan, and to test its correlation with the economic growth process. It

applies an alternative estimation and testing procedure that departs from the previous study in this subject.

As is evident from the results, the stock market has played a significant role in the Jordanian growth process. More specifically, we have found that the links between most of the stock market development indicators and economic growth are robust, even after controlling for economic variables associated with growth. The stock market size indicator- namely the market capitalisation ratio - enters positively and statistically significantly correlated with real per capita GDP growth. All the four liquidity indicators- value-traded, turnover, trading-volatility, and turnover-volatility ratios- enter positively and statistically significantly correlated with growth. Consistent with the previous studies the stock return volatility enters negatively but statistically insignificantly correlated with real per capita GDP growth.

We also found that measures of both the stock market and banking sector development enter significantly in the growth regressions. Besides emphasising that development of the financial sector in Jordan is important in its process of economic development, this finding suggests that the banking sector performs different functions from those performed by the stock market. This result is consistent with the view that the stock market offers opportunities primarily for trading risk and boosting liquidity; in contrast, banks focus on establishing long-term relationships with firms because they seek to acquire information about projects and managers and enhance corporate control. Overall, the results in general lend strong support to the model's theoretical prediction that the stock market and the banking sector have played a significant and complimentarily role in the growth process.

Chapter VI

Macroeconomic Evidence: Causality Test

6.1 Introduction

In the previous chapter, we investigated the hitherto neglected role of stock market development on economic growth in Jordan and found evidence to support the hypothesis that stock market development robustly affects the rate of economic growth. In consideration of these favourable results, however, they merely suggest that there is an exogenous component of stock market development that positively influences economic growth. Thus, these results are insufficient, by themselves, to lead us to conclude that the stock market is a leading sector in Jordan's economic development. Therefore, in order to deepen our analysis the following fundamental questions need more investigation. Is the stock market a leading sector in the process of economic development of Jordan? Or is there any feedback consequence effect of the growth generated elsewhere? Or it is a two-way causation? Using some of the latest time-series techniques, in this chapter we attempt to answer these questions.

The answers to the above questions could have policy implications for Jordan and for other countries with a similar economic structure. Providing evidence of causality will influence the degree of urgency attached to policy reforms designed to promote stock market development. Also providing evidence as to causes of stock market development will help policy makers design reforms that do indeed promote growth, enhancing stock market development.

Following Granger (1988), Sims *et al.,* (1990) and Toda and Phillips (1993), since cointegration has implications for the way causality testing is conducted, the causality tests are performed within a framework based on unit-root testing and cointegration. The advantage of testing for cointegration is the identification of a stable long-term relationship between stock

market development and economic growth, which could also be interesting from a theoretical point of view. The cointegration tests used are based on both the Engle-Granger (1987) two-step procedure and the Johansen (1988, 1991) maximum-likelihood method. Unlike most existing empirical literature, by using the Johansen approach we identify and report the long run relationship between stock market development and economic growth vectors, which is very important because significant implications can be derived concerning the equilibrium of the system.

The rest of the chapter is organised as follows. Section 6.2 provides a theoretical background to the idea that there is a two-way direction of causality between financial development and growth. Section 6.3 provides a review of the previous empirical studies and discusses their contributions and shortcomings. Section 6.4 presents the theoretical framework by defining and illustrating concepts of causality, stationarity, and cointegration. Section 6.5 describes the methodology and testable hypothesis. Section 6.6 discusses data. Section 6.7 presents the empirical results. Section 6.8 summarises the conclusions.

6.2 Theoretical Background

Recently, certain theoretical frameworks put forward the idea that there is a two-way direction of causality between financial development and growth. Patrick (1966) and more recently St Hill (1992) have worked out a useful reference framework for the study of the causal relationship between financial development and economic growth. They propose a distinction between the "*supply-leading*" approach and the "*demand-following*" approach to financial development. "*Demand-following*" financial development appears as a consequence of the development of the real sector. This implies the continuous widening of markets and a growing product differentiation, which makes necessary more efficient risk diversification and better control of transaction costs. This type of financial development, therefore, plays a more permissive role in the economic growth process. On the other hand, "*supply-leading*" financial development precedes demand for financial services and can have an autonomous positive influence on the growth process. Its role is to mobilise the resources blocked in the traditional sector, and transfer them to the modern sector which is capable of promoting growth.

According to Patrick's point of view that "*supply-leading*" financial development dominates the early stage of economic development, once the economic development process has reached maturity, "*demand-following*" financial development takes over. According to him, the role that financial institutions play in the process of development is either passive, merely reacting to the demands for financial services- "*demand-following*"- or positively active in devising and providing financial services for the real sector in anticipation for them- "*supply-leading*".

Patrick's framework is of interest as it highlights the two-way causality which may exist between financial development and growth[1]. Greenwood and Jovanovic (1990) suggest that economic growth renders the development of intermediation systems profitable and, at the same time, the establishment of intermediation systems helps speed up both growth in the real sector and the structural transformation of the economy. Levine (1992) argues that economic growth even influences the type of financial intermediation systems that the economy can afford. When real per capital income is low, the economy will select simple forms of financial intermediary whose main purpose will be to mobilise savings, diversify productivity risks and manage liquidity risks. The rise in per capita income enables the economy to develop more sophisticated financial intermediaries, whose financing will be correspondingly more costly as they will be involved in monitoring investment projects and the identification of the most cost-effective innovations.

Saint-Paul's (1992) is among the few models in which growth and financial development are jointly determined. In his model, financial markets entail real resource costs that are fixed or less than proportional to the volume of funds intermediated: as the economy grows, the individual incentive to participate in financial markets increases, as the benefits increase with the scale of funds invested while costs rise less or not at all[2].

Other endogenous growth models, such as those of Berthemey and Varoudakis (1996) and Greenwood and Smith (1997), also suggest that there is a two-way causal relationship between

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[1] Goldsmith (1969) also argues that the correlation between financial development and growth reflects a two-way causal relationship.

[2] Aside from the existence of fixed costs, the unit cost of financial intermediation may decrease with growth because of more aggressive competition among intermediaries.

financial development and economic growth. In particular, these theoretical analyses emphasise the role of financial markets in improving the allocation of resources and the costs to society of establishing a sophisticated financial super-structure. The general idea is that, on the one hand, financial markets and institutions facilitate the channelling of savings into productive investment opportunities, while, on the other, wealthier economies have a greater demand for financial services and are more able to afford a costly financial system. Harrison *et al.*, (1999) present a theoretical model of banking and growth, which generates a feedback effect between financial development and economic growth. They argue that economic growth increases the banks' activity and profits, and thus induces the entry of more banks. This entry reduces the average distance between banks and borrowers, promotes regional specialisation and reduces the cost of intermediation. This in turn increases investment and economic growth[3].

Blackburn and Hung (1998) present a theoretical analysis of the two-way causal relationship between growth and financial development by focusing on the role of financial institutions as delegated monitoring agencies which emerge endogenously to provide the most efficient means of channelling savings into investment. They argue that financial institutions, on one hand, lower the agency costs that must be paid by privately informed firms to secure loans for undertaking research projects. On the other hand, an increase in the number of such projects reduces the costs of establishing delegation.

In an important theoretical study, Boyd and Smith (1998) also suggest a two-way direction of causality between financial development and growth. Particularly, they have developed an endogenous growth model which presents a framework in which capital formulation is financed by issuing debt and equity. Boyd and Smith examine an economy in which investments are undertaken by a set of agents who require external financing, and in which their financial decision depends on the amount of information needed by the investor to

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[3] Similarly, Deidda and Crenos (2000) also provide a theoretical model which suggests that financial and economic development are jointly determined. They point out that, "*In the case of positive growth the market for deposits expands. This raises profitability of banking sector, which causes new banks to enter. The resulting inter-bank competition generated in this way increases the efficiency of the intermediaries operating in the credit market, since banks become more specialised. Via this basic mechanism financial intermediation could endogenously develop at some critical level of economic development*" (p.3).

monitor management. Boyd and Smith suggest two kinds of technology available to the investors: one which yields a return which is freely observable only by the initiating investor (debt); the other which yields a return which is publicly observable (equity). They conclude that as an economy moves along a growth path and accumulates capital, the relative price of capital falls, as a result monitoring costs will rise as the economy grows. As a consequence, investors will tend to employ observable capital production technology more intensively as an economy grows. Hence, as the economy grows, there will be an increased volume of equity market activities, and a fall in the debt/equity ratio. Accordingly, Boyd and Smith's analysis suggests that there is a bi-directional relationship between stock market development and economic growth.

Rajan and Zingales (1998) argue that finding a correlation between financial development and economic growth does not imply a causality relationship between these two variables. They show that both financial development and growth could be driven by a common omitted variable such as the propensity of households in the economy to save. Rajan and Zingales also show that there is a potential problem of anticipation. Financial development may predict economic growth simply because financial markets anticipate future growth. For example, stock market capitalisation presents the value of growth opportunities, while financial institutions lend more if they think real sectors will grow.

From all the above, we can see that besides the question of relation, there exists also the question of the direction of causality between financial development and economic growth. More and more authors stress the reciprocal relationship between financial development and economic growth. Economic growth makes the development of a financial intermediation system profitable, and the establishment of an efficient financial system permits faster economic growth. By pooling funds, risk diversification, liquidity management, project evaluation and monitoring, financial intermediation improves the efficiency of capital allocation and increases the productivity capacity of the real sector. At the same time, the technological efficiency of the financial sector increases with its size, because economies of scale and learning-by-doing effects are present in financial intermediation activities. As a result, the real sector can exert a positive externality on the financial sector through the

volume of savings. Therefore, financial development and economic growth positively influence each other in the process of development. In this chapter we attempt to investigate this issue *i.e.*, the direction of influence between stock market development and economic growth, taking Jordan as our case study using recently developed time series techniques.

6.3 Previous Empirical Literature

The empirical literature on the issue of causality between financial development and economic growth remains, however, very limited and current empirical literature in this field has completely ignored the stock market. This may be attributed to the scarcity of long time series for both national accounts and financial development (especially in developing countries).

The first study on the causality issue between financial development and economic growth as shown in the survey by Demetriades and Hussein (1996) is that of Gupta (1984). By utilised industrial output (available in quarterly frequency as opposed to national accounts which are available in annual frequency) to measure economic development and broad money (M2) to measure financial development, Gupta was able to show that changes in (M2) precede or lead changes in industrial output. However, the paper addresses certain issues not quite central to the debate and suffers from certain technical flaws. By concentrating on narrow definitions of financial development (M2), and economic development (industrial output)[4], the study addresses the question of what causes industrial output (thereby addressing the real effects of monetary policy), rather than the important question "*does financial development cause economic growth?*" Also, his analysis includes many observations over a short period of time. Campbell and Perron (1991), have shown that as far as the power of a time series is concerned, the span of the data is more important than the number of observations *i.e.* it is preferable to use data sets containing fewer annual observations over a long time period than data sets containing more observations over a shorter time period. Hendry *et al.*, (1984) also argue that increasing sample size by simple "*time disaggregation*" is not likely to reveal the long-run relationships.

[4] In many countries this represents a small proportion of total output.

Jung (1986) improved on this by addressing the causality issue using annual data and more standard measures of financial and economic development. However, Jung's causality tests were conducted in a levels Vector Autoregressive (VAR) model. Sims *et al.*, (1990), however, have shown that test statistics derived from levels VAR model are not valid unless the variables employed are stationary and cointegrated.

Two recent papers are much technically sound, Demetriades and Hussein (1996) and Rousseau and Wachtel (1998). Using data on sixteen countries over 27 years, Demetriades and Hussein (1996) conducted causality tests between financial development (as proxied by bank deposit liabilities to nominal GDP and the ratio of bank claims on the private sector to GDP) and real GDP growth. They found varying causality patterns across countries: limited evidence of finance as a leading sector in the process of economic development, considerable evidence of bi-directionality and some evidence of reverse causality. Their conclusions highlight the dangers of statistical inference based on cross-country studies alone, which implicitly treat different economies as homogeneous entities. Again, while this study is extremely revealing, it suffers from shortcomings. The interpretation of financial intermediation is limited to banks and takes no account of financial intermediation via other intermediaries such as stock markets.

Rousseau and Wachtel (1998) attempt to uncover the existence of any long-run relationships between financial and economic development for five industrialised countries from 1870-1929. They find unique cointegration relationships between real per capita levels of output, financial intermediation (as proxied by assets of commercial banks, assets of commercial banks and saving institutions, and assets of commercial banks, savings institutions, insurance companies, credit co-operatives, and pension funds) and money (as proxied by monetary base). Furthermore, they show that financial intermediation Granger-causes real output per capita, but find no evidence of feedback effects from output to financial intermediation. While their inclusion of the range of financial intermediaries is governed by the time period of their study, they do not include other intermediaries, *e.g.* stock markets development, which would be considered important in today's context. They point out that, "*data limitations associated with the historical period of our study and the dominant roles of commercial banks, saving*

banks, and insurance companies in the financial systems of these countries at the time justify our narrowed focus. Nevertheless, the role of financial markets in a broader context remains an important topic for further investigation" (p.675).

Luinte and Khan (1999) examined the long-run causality between financial development and economic growth in a multivariate vector autoregressive framework using 10 countries sample for a data set span of 38 years[5]. Their results show that in the long-term, financial depth, measured as a ratio of total deposit liabilities of deposit banks to one period lagged nominal GDP, is positively and significantly affected by the levels of per capita real income and real interest rate. Furthermore, they find bi-directional causality between financial development, proxied by financial depth, and economic growth in all countries included in their analyses.

As we have shown above, the most recent empirical literature in this field is restrictive in its definition of finance in that it has failed to look at financial intermediation outside of the banking sector and has completely ignored the stock markets. Consequently, in this chapter we address this shortcoming by examining the direction of causality between stock market development and economic growth with Jordanian data. Particularly, we run Granger-causality tests between the stock market development indicators and the per capita real GDP growth during the period 1978-98. In spite of the fact that the number of observations available is not ideal, the tests presented in this chapter provide us with preliminary answers to our questions. Nevertheless, the results obtained are quite encouraging and deserve to be taken into consideration. This study also, by extension of some of the work being conducted in the empirical growth and financial literature, is the first attempt to study the linkages between stock market development and economic growth in a time series framework using the recent econometric technique in testing causality[6].

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[5] Using multivariate VAR, Sinha and Macri (1999) also examine the causality between economic growth and financial development, measured by M1, M2 and domestic credit, for eight Asian countries. Their results show that there is a two-way causality relationship between growth and financial variables for India and Malaysia, one-way causality from financial variables to growth for Japan and Thailand and reverse causality for Korea, Pakistan and the Philippines.

[6] However, one year after completing this chapter, a study was published by Rousseau and Wachtel (2000). While their study is similar in sprit to ours, there are two essential differences. They examine the causality between stock markets and economic growth using panel data vector autoregressive for forty-seven countries; thus, they focus on between-country differences, while our focus is on one-country experiences. Another essential difference is that they conducted causality in a level VAR and they do not tests for stationarity and

6.3 Theoretical Framework of the Causality Test

The conventional procedure to test for Granger-causality between two variables x_{1t} and x_{2t} is to specify a kth order Vector Autoregressive (VAR) system as follows:

$$x_{1t} = \mu_1 + \pi_{11}(L)\ x_{1t-1} + \pi_{12}(L)\ x_{2t-1} + \varepsilon_{1t} \qquad (6.1)$$

$$x_{2t} = \mu_2 + \pi_{21}(L)\ x_{1t-1} + \pi_{22}(L)\ x_{2t-1} + \varepsilon_{2t} \qquad (6.2)$$

where μ_1 and μ_2 are constant drifts and $\pi_{ij}(L)$ are polynomials of order k-1 in lag operator L. Following Granger (1963), x_{1t} causes x_{2t}, if for all s>0, the mean squared error (MSE) of a forecasting of x_{t+s}, based on $(x_{1t}, x_{1t-1},\ldots)$ is not the same as the forecast of x_{t+s} that uses both $(x_{1t}, x_{1t-1},\ldots)$ and $(x_{2t}, x_{2t-1},\ldots)$. In other words, for linear functions, x_{2t} Granger-causes x_{1t}, if:

$$MSE\ |\ E(x_{1t+s} / x_{1t}, x_{1t-1},\ldots.)\ | \neq MSE\ |\ E(x_{1t+s} / x_{1t}, x_{1t-1},\ldots. x_{2t}, x_{2t-1},\ldots)\ | \qquad (6.3)$$

In terms of the VAR system defined above, x_{2t} Granger-causes x_{1t} when $\pi_{12}(L)$ is different from zero, and similarly x_{1t} Granger-causes x_{2t} when the polynomial $\pi_{12}(L)$ is not equal to zero.

The above VAR supposes that the variables x_{1t} and x_{2t} are stationary. If, however, the variables have unit roots, I(1), as Granger (1988) argued, the VAR model in levels is mis-specified, in which case causality testing can lead to erroneous conclusions. In this case we can exploit the possibility of cointegration between x_{1t} and x_{2t}, that is, if there exists a long-run relationship due to movements of these variables and possibilities that they will trend together towards a long-run equilibrium state, then according to the Granger theorem, it is necessary to re-parameterise the model in the equivalent "*error-correction model*" (ECM) forms:

$$\Delta x_{1t} = \mu_1 + \gamma_{11}(L)\ \Delta x_{1t-1} + \gamma_{12}(L)\ \Delta x_{2t-1} + \alpha_1(\beta' X_{t-1}) + \varepsilon_{1t} \qquad (6.4)$$

$$\Delta x_{2t} = \mu_2 + \gamma_{21}(L)\ \Delta x_{1t-1} + \gamma_{22}(L)\ \Delta x_{2t-1} + \alpha_2(\beta' X_{t-1}) + \varepsilon_{2t} \qquad (6.5)$$

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cointegration, therefore, their results do not shed any light on long-term trends between stock market development and economic growth.

where $\beta' x_{t-1}$ is a stationary linear combination of x_{1t-1} and x_{2t-1} and which represents the residuals from the cointegrating relationship. And γ_{ij} is now polynomials of order (k-2). Generalising equation (6.4) and (6.5), the ECM model can be rewritten as:

$$\Delta X_t = \mu + \Gamma(L)\,\Delta X_{t-1} + \prod X_{t-1} + \varepsilon_t \qquad (6.6)$$

where $X_t = (x_{it}, x_{2t})'$, $\mu = (\mu_1, \mu_2)'$, $\Gamma(L) = \{\gamma_{ij}\}$, $\Pi = \alpha\beta'$, Δ is the first-difference operator and ε_t is a vector of impulses which represent the unanticipated movements in X_t. If, however, the I(1) variables are not cointegrated then the system in (6.4) and (6.5) is not stationary and the Granger-causality tests may be performed without including the error correction term $\beta' x_{t-1}$[7].

Therefore, if x_{1t} and x_{2t} are I(1), then the attention focuses on the long-run parameter matrix $\Pi = \alpha\beta'$ in model (6.6). With one cointegration vector, $r = 1$, Π has rank equal to one with α and β both (2×1) vectors. β are the parameters in the cointegrating vector and α are the adjustment coefficients which measure the strength of the cointegrating relationship in the ECM. Hence the cointegrating methodology illustrates well the conflict that exists between the equilibrium framework and the disequilibrium environment for which data are collected. As formulated in the ECM, extending the equilibrium framework into one that accounts for disequilibrium by including the adjustment mechanisms represented by the error-correction terms can solve this conflict. Once the equilibrium conditions are imposed, the ECM describes how the system is adjusting in each time period towards its long-run equilibrium state. Since the variables are cointegrated, then in the short-run, deviations from this long-run equilibrium will feedback on the changes in the dependent variables in order to force their movements towards the long-run equilibrium state. The cointegrating vector from which the error-correction term is derived indicates the direction in which a stable, meaningful long-run equilibrium state exists. The coefficients of the error-correction term, α_1 and α_2 represent the

[7] As noted elsewhere also, if there are no unit roots, the VAR in equation (6.1) and (6.2) are stable and $\{x_t\}$ is a stationary process. Hence, the congenital Granger-causality tests are valid in a level framework.

proportion by which the long-run disequilibrium in the dependent variables is corrected in each short-term period[8].

Thus, if x_{1t} and x_{2t} are cointegrated, causality tests can be carried out using the ECM model. It should be noted here, however, that according to Granger (1988) and Granger and Lin (1995) in models (6.4)-(6.5) each equation contains two sources of interaction between x_{2t} by x_{1t}. For example, in equation (6.5), the first source is through the lagged dynamic terms Δx_{1t-1}, if $\gamma_{21}\neq 0$, which indicates the causal effects of x_{1t} on x_{2t}. The second is through the error-correction term $\beta' x_{t-1}$ when $\alpha_2 \neq 0$, which indicates the adjustment of x_{2t} to its long-run equilibrium with x_{1t}. Hence, the ECM-based causality is identified in a system where the short-run dynamics of the variables is influenced by their adjustment to their long-run equilibrium relationship.

According to the standard Granger-causality test, the error correction approach allows for the detection of a Granger-causal relation of x_{1t} on x_{2t}, even if the coefficients lagged difference terms (γ_{21}) is not significant. Thus, ECM measure the long-run equilibrium relationship, while the lagged difference terms measures the short-run causal relation. Granger (1988) notes that cointegration between two or more variables are already sufficient to indicate the presence of causality in at least one direction.

6.4 Empirical Methodology

In order to investigate the Granger-causality test between the stock market and economic growth in Jordan we perform methodology deals with the issues of unit roots and cointegration in terms of their implications for causality testing, which is gaining wide acceptance among researchers. This methodology involves the following steps:

1) The first step in our methodology involves the pre-testing for unit roots *i.e.* the investigation must first establish that the series of interest are non-stationary. In other words, the unit root tests are aimed at establishing the order of integration of each variable. Both the augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) unit root tests are herein used to

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[8] For more discussions of ECM model, see for example, Davidson and Mackinnon (1993, p. 715-30); Hamitlon (1994, Chapter 19, p. 571-629); and Patterson (2000, Chapter 8, p.316-72).

investigate the stationary status of each variable. First, however, we shall present some theoretical background of these two tests.

a. The Augmented Dickey-Fuller (ADF) test

The early approach to testing for the degree of integration and stationarity was called the Dickey-Fuller test. This approach tests for the value of ρ in equation (6.7) having a value of one or a value less than one

$$y_t = \mu + \rho y_{t-1} + \varepsilon_t \qquad (6.7)$$

where μ and ρ are parameters and ε_t is assumed to be white noise. y is a stationary series and integrated of order zero (a random walk with drift), if $-1<\rho<1$. If $\rho=1$, y is a nonstationary series. if the process is started at some point, the variance of y increases steadily with time and goes to infinity. If the absolute value of ρ is greater than one, the series is explosive. Therefore, the hypothesis of a stationary series can be evaluated by testing whether the absolute value of ρ is strictly less than one. Both the DF and the PP tests take the unit root as the null hypothesis H_0: $\rho=1$. Since explosive series do not make much economic sense, this null hypothesis is tested against the one-side alternative H_1: $\rho<1$.

There are some theoretical problems with equation (6.7) because the potential of nonstationarity breaks the assumptions of OLS regressions, which assume a constant variance in the residuals. Thus, the equation has to be re-specified in terms of changes in y_t as follows:

$$\Delta y_t = \mu + \gamma y_{t-1} + \varepsilon_t \qquad (6.8)$$

where $\gamma=\rho-1$ and the null and alternative hypotheses are H_0: $\gamma=0$, $H_0=\gamma<0$.

The simple unit root test described above, however, is valid if the series is an AR(1) process. If the series is correlated at higher order lags, the assumption of white noise disturbance is violated. Using the Augmented Dicky-Fuller test (ADF) solves this problem. The ADF test makes a parametric correction for higher order correlation by assuming that y series follows an AR (ρ) process and by adjusting the test methodology.

The ADF approach controls for higher order correlation by adding lagged difference terms of the dependent variable y to the right hand side of the regression:

$$\Delta y_t = \mu + \gamma y_{t-1} + \delta_1 \Delta y_{t-1} + \delta_2 \Delta y_{t-2} + \ldots + \delta_{p-1} \Delta y_{t-p+1} + \varepsilon_t \quad (6.9)$$

this augmented specification is then used to test H_0: $\gamma=0$, H_1: $\gamma<0$.

While this test is widely used in literature, it is sensitive to the degree of augmentation. Moreover, the distribution theory supporting the tests assumes the errors are statistically independent (serially uncorrelated) and have a constant variance.

b. The Phillips-Perron (PP) test

Phillips and Perron (1988) propose a non-parametric method of controlling for higher-order serial correlation in series. While the ADF test corrects for higher order serial correlation by adding lagged difference terms on the right-hand side of the AR(1) process, the PP test makes a correction to the t-statistic of the γ coefficient from the AR(1) regression to account for the serial in ε. This test allows for the fairly mild assumptions concerning the distribution of errors *i.e.* it allows the distributions to be independently identically normally distributed (NIID) (Rao, 1994).

Although, in theory, the PP test is known to be superior, Stock (1994) has shown that the ADF test performs better in practice. Cheung and Lai (1994, 1997, and 1998) and Martinez (1999) however, have shown that the PP test yields more favourable evidence than the ADF test. Consequently, we use both tests conducted for up to three-lag length around a nonzero mean and around a linear trend, to arrive at any conclusions.

2) One determines the order of integration for the variables under consideration; cointegration tests using both the Engle-Granger and Johansen approaches are employed to test for the possibility of cointegration among I(1) variables. The Engle-Granger two-step procedure is the simplest cointegration test for a bivariate model and is widely used in

empirical studies. In the first step, the parameters of the cointegration vector are estimated by running the following static regression in the levels of the variables:

$$x_{1t} = \beta_1 + \beta_2 x_{2t} + v_t \qquad (6.10)$$

where v_t is the residuals. For the consistency of the parameters estimates, the right hand side variable should be weakly exogenous with respect to the cointegrating parameters. The second regression tests for a unit root in these residuals of the relevant cointegration and is of the form:

$$\Delta v_t = \rho v_{t-1} + \sum_{s=1}^{n} d_s \Delta v_{t-s} \qquad (6.11)$$

the null and alternative hypotheses of non-cointegration between x_{1t} and x_{2t} being H_0: $\rho=0$, H_1: $\rho<0$[9]. It is worth noting here that the Engle-Granger procedure is safer from poor finite sample properties which may result in a large bias in the OLS estimators of the cointegrating relationship (Inder, 1993).

The Johansen procedure focuses on the rank of matrix $\alpha\beta'$, which determines the number of distinct cointegrating vectors. Johansen and Juselins (1990) describe two likelihood ratio tests, trace and maximal eigenvalue tests, which provide the cointegration rank and estimate the long-run parameter matrix $\alpha\beta'$. The trace test is based on the stochastic matrix and is defined as:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{k} \log(1-\hat{\lambda}_i) \qquad (6.12)$$

for r=0,1,...k-1, where T is the number of useable observations, and λ_i is the estimated value of the characteristic roots. The null hypothesis of this test is that the number of distinct cointegrating vectors is less than or equal to r *(i.e,* no cointegration vector) against the alternative r>0 (one or more cointegrating vectors).

The second test, which is the so-called maximal-eigenvalue test, is based on the following:

[9] For more detailed information about the Engle-Granger two-step test see for example Maddala and Kim (1999) and Patterson (2000).

$$\lambda_{\max}(r_1, r+1) = \quad -T\sum_{i=r+1}^{k}\log(1-\hat{\lambda}_{r+1}) \tag{6.13}$$

for r=0,1,..k-1, where T is the number of useable observations; r is the number of cointegrating vectors; and λ_{r+1} is the estimated value of characteristic roots (called eigenvalues) from the estimated $\alpha\beta'$ matrix. Based on the above equation, we can also compute the maximum eigenvalue statistic from the trace statistic as:

$$\lambda_{\max} = (r_1, r+1) = \quad \lambda_{trace}(r) - \lambda_{trace}(r+1) \tag{6.14}$$

This statistic tests the null hypothesis that the number of cointegration vectors is r against a specific alternative of (r+1) cointegrating vectors. The distribution of these statistics depends on the number of nonstationary components (*i.e.*, the number of variables we are testing for cointegration) defined by (n-r).

Since these tests are sensitive to the choice of the lag length in various model specifications, we must determine the appropriate lag length of various model specifications in VAR. As shown for example by Thornton and Batten (1985), the choice of a specific lag length of VAR model can have a significant influence on the test results. One possible procedure is to allow for different lag lengths for each equation. However, in order to preserve the symmetry of the system it is common to use the same lag length for all equations. Appropriate lag length selection is important since if the lag lengths included is too few, the models may be misspecified whereas if the number of lag lengths included is too large, degrees of freedom are wasted (Hsiao, 1981).

Unfortunately, there does not exist a generally best method for choosing the lag length. One test statistic used in the literature is the likelihood ratio (LL) statistics recommended by Sims *et al.*, (1990). However, this statistic is based on asymptotic theory that is not very useful for the small size sample which is available for this study. The approach taken here is the Akaike information criterion (AIC)[10]. This information criterion has been widely used in the time

[10] AIC information criterion of VAR is defined as: $-2\tau/T+2n/T$, where $n=\kappa(d+p\kappa)$ is the total number of estimated parameters in VAR, T is the number of observation, τ is the log-likelihood value is computed assuming a multivariate normal (Gaussian) distribution as: $\tau=(T\kappa/2)(1+\log 2\pi)-(T/2)\log|\Omega|$, where Ω is the estimated residual covariance. For more details see Grasa, (1989).

series analysis to determine appreciative length of the distributed lag (Lutkepoht, 1991; and Maddala and Kim, 1999). The basic methodology involves selecting the models with the lowest AIC values. Specifically, the methodology involves first calculating the AIC values for a lag length of one, then increasing the lag length by one *i.e.* calculating the AIC value for the new lag length: if the higher lag length yields a lower number repeat step two, if increasing the lag length yields a higher number, stop and choose the lag length that yields the lowest value, which indicates that this length leaves the residuals approximately independently identically normally distributed (NIID)[11].

In this contest it is important to note that the Johansen procedure has several advantages over the popular residual-based Engle-Granger two-step approach in testing for cointegration. Specifically, they may be summarised as follows: (i) the Johansen procedure does not, a priori, assume the existence of at most a single cointegration vector; rather it explicitly tests for the number of cointegrating relationships; (ii) unlike the Engle-Granger procedure which is sensitive to the choice of the dependent variable in the conitegrating regression, the Johansen procedure assumes all variables to be endogenous; (iii) the Johansen procedure is established on a unified framework for estimating the testing cointegrating relations within the VECM formulation. Moreover, as reported by Campbell and Perron (1991), OLS estimates of conitegrating vectors, particularly in small samples, may be severely biased[12]; (iv) the Johansen procedure estimates the short-run dynamics simultaneously, which increase the efficiency of estimation; and (v) the Johansen procedure allows for testing the restrictions on the cointegrating vectors[13]. Nevertheless, the Johansen procedure is not free from problems either. As is now well known, Johansen procedure results are sensitive to the lag length of the VAR (Benerje *et al.,* 1993).

3) When the evidence of cointegration is optioned, the VAR with an error-cointegration constraint is set up (using residuals), and is in the form:

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[11] The presence of autocorrelation in the residual vector is an indicator of model mis-specification (see Ender, 1995)

[12] For a more detailed discussion of this argument see for example Masih and Masih (1995, 1998).

[13] See for example Kennedy (1998, Chapter 17, pp. 263-77).

$$\Delta x_{1t} = \mu_1 + \gamma_{11}\,\Delta x_{1t-1} + \gamma_{12}\,\Delta x_{1t-2} + \gamma_{13}\,\Delta x_{2t-1} + \gamma_{14}\,\Delta x_{2t-2} + \alpha_1(\beta' X_{t-1}) + \varepsilon_t \qquad (6.15)$$

$$\Delta x_{2t} = \mu_2 + \gamma_{21}\,\Delta x_{1t-1} + \gamma_{22}\,\Delta x_{1t-2} + \gamma_{23}\,x_{2t-1} + \gamma_{24}\,\Delta x_{2t-2} + \alpha_2(\beta' X_{t-1}) + \varepsilon_t \qquad (6.16)$$

where $\beta' x_{t-1}$ are the error-correction terms given by the residuals from the cointegrating equation; α_1 and α_2 are the adjustment coefficients; x_{1t} represents economic growth and x_{2t} stock market development indicator.

Granger (1988) points out that if a pair of series is cointegrated, then there must be Granger-causation in at least one direction. To investigate the causality between stock market development and economic growth, we perform two types of causality test, depending on the source of causality tests.

- F-tests are applied to test the joint significance of lagged dynamic terms in equation (6.15) and (6.16):

F_1: H_0: $\gamma_{13} = \gamma_{14} = 0$,

F_2: H_0: $\gamma_{21} = \gamma_{22} = 0$.

These tests are tests of Granger-causality between economic growth and stock market development. F_1 tests the null hypothesis that stock market development does not Granger-causes economic growth, and F_2 tests the null hypothesis that economic growth does not Granger-cause stock market development. If the null F_1 (H_0: $\gamma_{13}=\gamma_{14}=0$) is not rejected, this implies that the stock market development variable does not cause economic growth in the short-run. Likewise, non-rejection of the null F_2 (H_0: $\gamma_{21}=\gamma_{22}=0$) implies that economic growth does not cause stock market development in the short-run (no feedback effect). On the other hand, rejection of $F_1 \cap F_2$ implies a bi-directional relationship between stock market development and economic growth in the short-run.

- t-tests are applied to test for the statistical significance of the lagged cointegrating vector in two of the equations, which are tests of weak exogeneity of the variable. A dependent variable is weakly exogenous when the error-correction term is insignificant in its equation. This means that this variable is not adjusting to the long-run equilibrium state

t_1: H_0: $\alpha_1 = 0$,

t_2: H_0: $\alpha_2 = 0$.

where t_1 tests for weak exogeneity of x_{1t}, t_2 tests for weak exogeneity of x_{2t}. If the null t_1 (H_0: α_1=0) is not rejected then the economic growth vector is weakly exogenous with respect to the stock market development variable vector implying that stock market development does not cause economic growth in the long-run. Likewise, non-rejection of the null t_2 (H_0: α_2=0) implies that the stock market development variable vector is weakly exogenous with respect to the economic growth, hence economic growth does not cause stock market development in the long-run. On other hand, rejection of $t_1 \cap t_2$ implies a bi-directional relationship between stock market development and economic growth in the long run.

4) In the absence of cointegration evidence, we tested for causality between stock market development and economic growth within the VAR model, which is described in equations (6.15) and (6.16), without including an error-correction term. In such a case, the Granger-causality between stock market development and economic growth are performed by one type of causality test. The joint significance of lagged dynamic terms in the model:

F_1: H_0: $\gamma_{13} = \gamma_{14} = 0$,

F_2: H_0: $\gamma_{21} = \gamma_{22} = 0$

if the evidence does not reject the null hypothesis in F_1, this implies that stock market development does not Granger-cause economic growth, and if the evidence rejects the null hypothesis in F_2, this implies that economic growth does not Granger-cause stock market development. On the other hand, rejection of $F_1 \cap F_2$ implies a bi-directional relationship between the stock market and economic growth.

6.5 Data

Since the aim of our study is not so much to highlight what factors cause economic growth as to examine whether the stock market is a leading sector in the process of economic growth in

Jordan, or whether there is a feedback consequence effect of the growth generated elsewhere, the focus here is therefore on the causal link between the two variables, economic growth and stock market development. Consequently, we do not include the other known variables that may cause economic growth. Moreover, the power of the statistical tests and estimation procedures with include more variables besides the stock market development indicator is greatly reduced in small samples. This is an additional reason why we do not attempt to estimate the models containing other variables that may affect growth.

As in Chapter V, six indicators for stock market development are used. These indicators are associated with the stock market size, volatility and liquidity. In brief, the stock market capitalisation adjusted for the size of the economy (GDP) is used as an indicator for the stock market size. Volatility is measured as an annualised standard deviation that is based on weekly market returns. Finally, we use four indicated measures of market liquidity: value-traded, trading-volatility, turnover and turnover-volatility ratios[14]. As has been noted elsewhere, each of these indicators has shortcomings and non-directly measures the provision of financial services provided by the stock market; using a variety of measures provides a richer picture of ties between stock market development and economic growth than if a single indicator is used[15].

Following the standard practice in the economic growth literature, we proxy the growth rate of real per capita GDP for economic growth, which is generated as the first difference in logarithm of the real per capita GDP series. The consumer price index has been chosen as a deflator.

All data are annual, spanning the period 1978 to 1998. We use here annual data containing fewer observations rather than using quarterly data containing more observations over a short-term period[16], because it is now well-known that unit root and cointegration tests require a

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[14] All the variables are translated into their natural logarithm prior to analysis.
[15] As in Chapter V and throughout this study, we distinguish between two groups of measures depending on denominator. The first groups consist of ratios of two stock variables, whereas the measures in the second group are ratios of a stock variable and a flow variable, especially GDP. Whereas stock variables are measured at the end of a period, flow variables are defined relative to a period. This presents problems in the second group of indicators, both in terms of correct timing and in terms of deflating correctly.
[16] As we have mentioned in Chapter V, quarterly data on GDP is available in Jordan only since 1992.

long time span of data rather than merely a large number of observations. There is no gain in switching from low frequency to high frequency data and merely increasing the number of observations (Campbell and Perron, 1991; Hakkio and Rush, 1991; Demetriades and Hussein, 1996; and Luinte and Khan, 1999). Campbell and Perron (1991) suggest that "*in most applications of interest, the data set containing fewer annual data over a long time period will lead to the test having higher power than if use was made of the data set containing more observations over the short period*" (p.153)[17].

Hakkio and Rush (1991) argue that there is no answer to the question, how long is the long term. However, they argue that the length of the long term is varies between problems. For some problems the long term may be a matter of decades while for others a matter of months. In previous studies on the causality issues between financial development and growth, Jung (1986) and Demetriades and Hussein (1996) using bivariate time-series tests of causality for data sets have an average time span of 15 and 27 years, respectively, Rousseau and Wachtel (1998) and Luinte and Khan (1999) using multivariate tests of causality for data sets have an average time span of 50 and 37 years, respectively[18], and they argue that these spans of data are long enough to capture the long run relation between financial development and economic growth[19]. Based on the above views, the available data set in this study, which has a time span of 21 years, could be enough to capture the long-run relationship between stock market development and economic growth in a bivariate vector autoregressive (VAR) model used here.

The data source for growth is compiled from various issues of the annual report of the CBJ. The data series for the stock market development indicators- stock market capitalisation, value- traded, and turnover ratios- were obtained from various issues of the annual report of the AFM. The weekly price index from the first of January, 1978 to the end of December, 1998 is obtained from the AFM database.

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[17] Groen (2000) also points out "*Extending the number of observations through an increase in the data frequency for the same time span does not improve the power of tests on unit roots or cointegration*" (p.2).
[18] In Rousseau and Wachtel (1998), VARs consist of three variables and in Luinte and Khan (1999) VARs consist of five variables.
[19] In a more recent study Catalan, *et al.,* (2000) used bivariate time-series tests for causality between the development of contractual savings and stock markets using 17 observations.

6.6 Empirical Results

As mentioned above, the focus here is on the causal link between the two variables, economic growth and stock market development. In the following paragraphs we present the test results concerning unit root, cointegration, and Granger-causality.

6.6.1 Test Results for Unit Root

Before we examine cointegration, the order of integration of the stock market development and economic growth variables must be determined. As is well known, the cointegration relationship exists within a set of nonstationary time series when a linear combination of the variables that yields stationary results can be identified. For this purpose, we perform a unit root test using both the ADF and PP tests. These tests are applied to the level variables as well as to their first differences in logarithm terms. The null hypothesis tested that the variable under investigation has a unit root, against the alternative that they do not.

The results of the unit root tests are presented in Table (6.1). The second and third columns of Table (6.1) report tests of stationarity about a non-zero mean. We then test stationarity about a deterministic linear time trend. The results of these tests are reported in the fourth and fifth columns of the table. The reported results indicate the presence of a unit root in log levels of all variables *i.e.*, the null hypothesis that each of the time series has a unit root cannot be rejected at the five-percent level for both tests. However, as we can show from the bottom half of Table (6.1), there is no evidence from either test to support a unit root in first difference of all the variables (both tests reject the null hypothesis at the five-percent level). These results are broadly consistent with the hypothesis that all the variables under investigation are individually integrated of order one I(1).

Table 6.1: Test Results for Unit Roots

	Stationary around a non zero mean		Stationary around a linear trend	
	ADF	**PP**	**ADF**	**PP**
Level				
Per Capita Real GDP Growth	-2.233	-2.823	-2.187	-2.817
Market Capitalisation Ratio	-1.142	-1.609	-2.029	-2.408
Value Traded Ratio	-2.286	-2.439	-2.483	-2.509
Turnover Ratio	-2.260	-2.338	-2.017	-2.202
Trading/Volatility	-2.220	-2.475	-2.394	-2.738
Turnover/Volatility	-2.489	-2.838	-2.379	-2.853
Volatility	-2.752	-3.100	-3.057	-3.039
1st Difference				
Per Capita Real GDP Growth	-3.059	-5.631		
Market Capitalisation	-3.802	-5.004		
Value Traded Ratio	-4.382	-5.322		
Turnover Ratio	-4.030	-5.027		
Trading/Volatility	-4.236	-5.549		
Turnover/Volatility	-4.223	-5.915		
Volatility	-5.917	-5.987		
1% Critical Value	-3.857	-3.830	-4.535	-4.574
5% Critical Value	-3.040	-3.029	-3.675	-3.692
10% Critical Value	-2.661	-2.655	-3.276	-3.286

The variables are as defined in the text. The null hypothesis tested is that the relevant series contains a unit root against the alternative that it does not. ADF is the Argumented Dickely-Fuller test. PP is the Phillips-Perron test.

6.6.2 Test Results for Contegration

Given the results of the unit root test, it is necessary to use cointegration methodology in order to test the existence of the stable relationship between economic development as proxied by the level of real per capita GDP growth and the state of the stock market development as captured by: stock market capitalisation ratio, value-traded ratio, turnover ratio, traded-volatility ratio, turnover-volatility ratio and volatility. For this purpose we report the cointegration test based on the Engle and Granger (1987) and Johansen (1988) methods.

Table (6.2) presents results of testing for cointegration using the Engle-Granger procedure. Each row reports coefficients from two regressions. As mentioned in Section 6.4, the first one is the cointegration regression, equation (6.10), where the dependent variable is the per capita real GDP growth and the independent variable is the stock market development indicator. The second one, equation (6.11), tests for unit root regression the relevant cointegration regression.

The coefficients reported from the first regression are β_1 and β_2 and the ρ is the ADF test for the residuals from (6.11).

The estimates of the cointegration regressions and the results of applying the ADF test for detecting a unit root in the residuals of these cointegrations are reported in Table (6.2). As can be seen, this test suggests that five of the stock market development indicators- namely the market capitalisation, value-traded, turnover, traded-volatility and turnover-volatility ratios are cointegrated with the per capita real GDP growth at the five-percent level of significance. These results are consistent with the inference that there is a stable, long-run equilibrium relationship between each of these variables and per capita real GDP growth. however, the Engle-Granger results for market volatility do not detect cointegration with per capita real GDP growth even at the ten-percent level of significance.

Table 6.2: The Engle-Granger Cointegration Tests

	β_1	β_2	ρ	k
Market Capitalisation	-1.832** (-2.545)	0.276** (2.255)	-3.910*	3
Value Traded Ratio	-1.051* (-2.767)	0.061*** (1.611)	-3.231**	2
Turnover Ratio	-1.106* (-3.328)	0.056** (2.452)	-3.892*	3
Trading/Volatility	-1.090* (-3.202)	0.0405** (2.080)	-3.260**	2
Turnover/Volatility	-1.088* (-3.244)	0.0410** (2.586)	-3.343**	1
Volatility	1.648** (2.467)	-0.786 (-1.221)	-2.589	2

The coefficient β_1 and β_2 are estimated from the regression in (6.10) using OLS. The coefficient ρ is estimated from the regression from (6.11) using OLS, and k indicates the number of lags used. The numbers in parentheses are the t-statistics. The residuals in (6.10) are also checked using Ljung-Box Q statistics (the results not reported here) for first and higher order serial correlation. "*" Significant at the 1% level, "**" significant at the 5% level, "***" significant at the 10% level.

The second test of cointegration is based on the maximum likelihood estimates of a vector autoregressive model of Johansen. This test identifies the number of stationary long-run relations that exist among an integrated time series. Table (6.3) reports results of this test, which included both maximum eigenvalue and the trace statistics and the corresponding λ values. Table (6.4) reports estimates of corresponding Π, which contains the cointegrating vectors and the adjustment coefficients of variables. Since the Johansen procedure is sensitive

to the choice of the lag length in VAR, we selected a lag length based, as mentioned in Section (6.5), on the Akaike's information criterion (AIC). Using this lag specification, diagnostic checking tests for normality and absence of serial correlation were performed on the residuals of each equation in VAR. The results of these tests (not reported here) indicate that this lag length left the residuals approximately in an independently identically normal distribution.

As can be seen from Tables (6.5) and (6.6), Johansen cointegration test results, in most cases, yield relatively the same results as Engle-Granger cointegration tests. However, these results are unexpected since the two procedures are different and use different techniques. While the Engle-Granger cointegration method uses ordinary least squares to estimate the cointegration vectors and the VECM in two separate steps, the Johansen method uses the maximum-likelihood procedure and estimates jointly the cointegration vectors and the VECM. In addition, one would suspect that, with the Engle-Granger procedure, substantial bias is occurring in the OLS estimates of cointegration vectors (Inder, 1993). The Johansen procedure, as we have mentioned before, is not free from problem either. The main shortcoming of this technique is that it is highly sensitive to the lag length of the VAR.

The Johansen cointegration test results under both the maximum eigenvalue and trace statistics suggest that the per capita real GDP growth and each of the stock market development indicator used- the market capitalisation ratio, value-traded ratio, turnover-ratio, traded-volatility ratio, turnover-volatility ratio and volitality- is cointegrated at least at the five-percent level of significance.

These results indicate in general that there is a stable, long-run equilibrium relationship, which ties together the evolution of stock market development and the evolution of per capita real GDP growth. Consequently, the cointegrating relationship can be regarded as a long-run equilibrium state and short-run dynamics of the variables can be viewed as fluctuations around this equilibrium. Hence the short-run movements of the variables are characterised by the dynamic interaction among them with feedback going from one variable to the other, or both ways, depending on the direction of causality. The cointegration vectors indicate the direction in which the system should be moved to reach this long-run equilibrium state. The error-correction term indicates how far the variables are away from their long-run equilibrium path.

Thus, since they are cointegrated, in each short-run period the per capita real GDP growth and the stock market development indicator are adjusting to their long-run equilibrium relationship.

The estimated α vectors are significant indicates that the stock market development indicators and per capita real GDP growth are adjusting to their long-run equilibrium relationship, and the magnitudes of these coefficients shows the speed of adjustment to disequilibrium from their long-run equilibrium state. In general, for each of these indicators, the speed of stock market development towards long-run equilibrium seems to be higher than that of the per capita real GDP growth.

The interpretation of the effects of the error correction terms in the ECM model is important because significant implications can be derived concerning the equilibrium of the system. For example, given the estimated long run relationship between per capita real GDP growth (x_{1t}) and the market capitalisation ratio (x_{2t}), the error correction term ($\beta' x_{t-1}$) can be written as: $\beta' X_{1t-1} = x_{1t-1} - 0.688 x_{2t-1} - 4.961$. Since the error-correction coefficient (α) of this term is negative in the economic growth equation (6.15), which is acorrect sign, since the cointegration vector is normalised (the coefficient takes a value of unity in the vector) in per capita real GDP growth (x_{1t}), then, depending on whether the error-correction term is positive or negative or zero, there are three different types of effect on economic growth coming from the error-correction term. When the variables in the previous period are in equilibrium state, then there is no effect on economic growth coming from the error-correction term. This happens when the $\beta' x_{t-1}$ is equal to zero. When the error-correction term is negative ($\beta' x_{t-1} < 0$) then its effect on economic growth is positive. In particular, negative deviation from the stationary relationship will be corrected by an increase in economic growth. Finally, when the error-correction term is positive ($\beta' x_{t-1} > 0$), then its effect on economic growth is negative; the positive deviation from the stationary relationship will be corrected by a decrease in economic growth.

The facts above have straightforward implications concerning the short-run behaviour of economic growth in connection to the long-run relationship that exists between stock market

development and the real sectors of the economy. They state that, in the short–run, an imbalance between per capita real GDP and a certain level of market development will have either a negative or a positive impact on economic growth.

Table 6.3: The Johansen Cointegration Tests (Testing the Rank of Π)

Maximal Eigenvalue Test			Trace Test			λ
H_0	H_1	Statistics	H_0	H_1	Statistics	
(1) Variables included in VAR: Per Capita Real GDP Growth, Market Capitalisation Ratio (k=2)						
r = 0	r ≥1	23.008*	r = 0	r=1	26.412*	0.614
r ≤ 1	r =2	3.325	r ≤ 1	r =2	3.325	0.153
(2) Variables included in VAR: Per Capita Real GDP Growth, Value Traded Ratio (k=2)						
r = 0	r ≥1	32.304*	r =0	r =1	39.365*	0.850
r ≤ 1	r =2	7.060	r ≤ 1	r =2	7.060	0.339
(3) Variables included in VAR: Per Capita Real GDP Growth, Turnover Ratio (k=3)						
r = 0	r ≥1	20.274*	r =0	r =1	24.557*	0.595
r ≤ 1	r =2	4.283	r ≤ 1	r =2	4.283	0.212
(4) Variables included in VAR: Per Capita Real GDP Growth, Traded-Volatility Ratio (k=2)						
r = 0	r ≥1	14.005**	r =0	r =1	18.752 *	0.541
r ≤ 1	r =2	4.746	r ≤ 1	r =2	4.746	0.231
(5) Variables included in VAR: Per Capita Real GDP Growth, Turnover-Volatility Ratio (k=2)						
r = 0	r ≥1	17.356*	r =0	r =1	21.731*	0.595
r ≤ 1	r =2	4.375	r ≤ 1	r =2	4.375	0.268
(6) Variables included in VAR: Per Capita Real GDP Growth, Volatility (k=1)						
r = 0	r ≥1	14.638**	r =0	r =1	17.586**	0.663
r ≤ 1	r =2	2.948	r ≤ 1	r =2	2.948	0.255

Notes: H_0 and H_1 are the null and alternative hypotheses, respectively. λ, the corresponding value. The 5% critical values for the maximal eigenvalue test are 15.87, 9.16, respectively and the 10% critical values are 13.81, 7.53, respectively, for $H_)$ and H_1. The 5% critical values for the trace test are 20.18, 9.16, respectively, and the 10% critical values are 17.88, 7.53, respectively, for H_1 and H_2. "*" denotes significant at 5 percent, and "**" denotes significant at 10 percent. For each stock market development indicator the Johansen Cointegration tests were performed with lag lengths (k=n) based on the Akaike's Information (AIC) criterion. Using these lag lengths, the residuals in each of the VAR equations were checked for normality and absence of serial correlation.

Table 6.4: The α and β Vectors

Variables	β'	α
(1) Variables included in VAR: Per Capita Real GDP Growth, Market Capitalisation Ratio		
Per Capita Real GDP growth	1.000	-0.202*
		(-3.939)
Market Capitalisation Ratio	-0.688**	0.291**
	(-2.321)	(2.321)
Intercept	-4.961***	
	(-1.876)	
(2)Variables included in VAR: Per Capita Real GDP Growth, Value Traded Ratio		
Per Capita Real GDP growth	1.000	-0.0764*
		(-2.848)
Value Traded Ratio	-1.547 *	0.140**
	(-3.434)	(2.095)
Intercept	-11.375*	
	(-3.242)	
(3)Variables included in VAR: Per Capita Real GDP Growth, Turnover Ratio		
Per Capita Real GDP growth	1.000	-0.0591**
		(-2.316)
Turnover Ratio	- 1.402*	-0.0982***
	(-2.916)	(-1.865)
Intercept	-4.461	
	(-0.517)	
(4)Variables included in VAR: Per Capita Real GDP Growth, Traded-Volatility Ratio		
Per Capita Real GDP growth	1.000	-0.1226**
		(-2.156)
Traded-Volatility ratio	- 3.461**	0.0212
	(-2.461)	(1.306)
Intercept	-3.713	
	(-0.918)	
(5)Variables included in VAR: Per Capita Real GDP Growth, Turnover-Volatility Ratio		
Per Capita Real GDP growth	1.000	-0.117**
		(-1.982)
Turnover-Volatility Ratio	- 2.858**	0.069*
	(-2.448)	(3.671)
Intercept	3.504	
	(0.798)	
(6)Variables included in VAR: Per Capita Real GDP Growth, Volatility		
Per Capita Real GDP growth	1.000	0.062*
		(3.231)
Volatility	2.179**	0.0845
	(3.517)	(1.069)
Intercept	9.160	
	(1.597)	

In each case the cointegration vector (β') is normalised on per capita real GDP growth. The numbers in parentheses are t-statistics. "*", "**" and "***" indicates statistically significant at 1%, 5% and 10%, respectively.

6.5.3 Test Results for Granger-Causality

In order to know whether the dynamic interactions between stock market development and economic growth in Jordan are characterised by feedback going from stock market development to real output or from real output to stock market development, or both, we should now turn to testing for the direction of Granger-causality. Given the results of the cointegration tests, we conduct VECM based causality tests using the Engle-Granger and/or Johansen cointegrating vectors, for the pairs of variables for which each of the two procedures shows evidence of cointegration, otherwise the causality test is conducted using first-differenced VARs. We use two statistical tests to examine the direction of causality: F-tests applied to test the dynamic exogenous terms in the VECM, and t-tests applied to test the coefficients of the error-correction terms in the VECM. For the stock market development indicators for which any of these techniques shows clear evidence that they are not cointegrated with per capita real GDP (market volatility in which the Engle-Granger test failed to detect cointegration) we conduct causality tests using first-differenced VARs applying one type of statistical test, F- tests.

Table (6.5) reports the results of these statistical tests using Engle-Granger cointegration vectors; Table (6.6) contains the same tests using the Johansen cointegrating vectors. It is interesting to note that, with both procedures, the Granger-causality tests are in favour of the hypothesis that the relationship between stock market development and economic growth in Jordan is bi-directional. As can be seen from Table (6.5), for each of the four stock market development indicators- the market capitalisation, value-traded, turnover, traded-volatility ratio and turnover-volatility ratios- the Engle-Granger based causality tests reject the hypothesis of non-causality from each of these indicators to per capita real GDP growth under both possible sources of causation (the error-correction term and the lagged dynamic terms) at the five-percent level of significance. The statistical significance of the F_1 statistics (joint test for the coefficients of the lagged dynamic terms) indicates that short-term changes in the growth rate of each of these stock market development indicators have an influence on future growth rates of per capita real GDP. This means that a higher growth rate of stock market capitalisation or any one of the liquidity indicators results in higher growth rates of per capita

real GDP growth. The statistical significance of t_1 statistics (tests for the coefficients of the error-correction terms) implies that each of these indicators (in level not in growth rate) has an influence on economic growth through the error-correction terms. Since the error-correction terms enter significantly into the economic growth equation, it means that, in each short-term period, economic growth is adjusting to the previous period's imbalance between stock market development and per capita real GDP growth.

On the other hand, the hypothesis of non-causality from per capita real GDP growth to each of these indicators is rejected also under both possible sources of causation at the five-percent level of significance. This implies that a higher rate of per capita real GDP growth yields a higher-level growth in these indicators. Thus, there seems to be a bi-directional (a two-way causality) relationship between economic growth and these indicators of stock market development. These important results suggest that an expansion of the stock market induces the real economy to grow and, in turn, increases the demand for its resources. In other words, economic growth enhances stock market development, and the higher development in stock market permits faster economic growth. By facilitating liquidity, diversification risk, aggregating and disseminating information about firms, promoting corporate control and monitoring, mobilising capital, the stock market improves the efficiency of capital allocation and increases the productive capacity of the real sector. At the same time, the efficiency of the stock market increases with its size and liquidity. As a result, the real sector can exert a positive externality on the stock market through the volume of savings. Therefore, stock market development and economic growth positively influence each other in the process of development.

Since the Engle-Granger cointegration tests (Table, 6.2) suggest that there is no cointegration between per capita real GDP growth and market volatility, we tested for causality between this indicator and economic growth within a first-difference VAR model without including an error-correction term. The results of this test are also reported in Table (6.5). As can be seen from the F_1-statistic, there is no evidence of causality from market volatility to per capita real GDP growth even at the ten-percent level, but there is evidence of reserve causality from per capita real GDP growth to this indicator at the five-percent level of significance.

Table 6.5: Granger-Causality Test Results: The Engle-Granger Procedure

(1) Granger-causality between Per capita real GDP growth (x_1) and market capitalisation ratio (x_2)		
Null Hypothesis:	x_2 does not Granger-cause x_1 t_1 =4.314* F_1 = 6.644*	x_2 does not Granger-cause x_1 t_2= 2.495** F_2=3.137***
(2) Granger-causality between Per capita real GDP growth (x_1) and value traded ratio (x_2)		
Null Hypothesis:	x_2 does not Granger-cause x_1 t_1=1.919*** F_1= 3.622**	x_2 does not Granger-cause x_1 t_2=4.257* F_2=4.954**
(3) Granger-causality between Per capita real GDP growth (x_1) and turnover ratio (x_2)		
Null Hypothesis:	x_2 does not Granger-cause x_1 t_1= 2.043*** F_1=3.848**	x_2 does not Granger-cause x_1 t_2=3.359* F_2=3.982**
(4) Granger-causality between Per capita real GDP growth (x_1) and traded-volatility ratio (x_2)		
Null Hypothesis:	x_2 does not Granger-cause x_1 t_1=1.886*** F_1=2.980***	x_2 does not Granger-cause x_1 t_2= 2.870* F_2=4.016**
(5) Granger-causality between Per capita real GDP growth (x_1) and turnover-volatility ratio (x_2)		
Null Hypothesis:	x_2 does not Granger-cause x_1 t_1= 2.257** F_1=3.039***	x_2 does not Granger-cause x_1 t_2=3.848* F_2=6.016*
(6) Granger-causality between Per capita real GDP growth (x_1) and volatility (x_2)[a]		
Null Hypothesis:	x_2 does not Granger-cause x_1 F_1=1.71	x_2 does not Granger-cause x_1 F_2=3.821**

"*", "**", "***" indicate significance at the 1%, 5% and 10% leves, respectively.

[a] since the Engle-Granger cointegration tests (Table 6.2) suggest that per capita real GDP growth and market volatility are not cointegrated, we tested for causality between these two variables within a first-difference VAR model without including an error-correction term.

Table (6.6) contains the results of Granger-causality tests based on the Johansen cointegrating vectors. In general, in most cases the results are broadly consistent with those obtained from the Engle-Granger causality based tests[20]. All the stock market development indicators exhibit causation from stock market development to per capita real GDP growth through both the error-correction terms and the lag dynamics terms. These results emphasise largely the previous results from the Engle-Granger cointegration vectors. The statistical significance of both the error-correction terms and the lag dynamics terms, as we have mentioned above,

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[20] These results, however, are unexpected since the two procedures are different and use different techniques. The While Engle-Granger approach uses ordinary least squares, the Johansen method uses the maximum-likelihood. According to Vilassuso (2001) the maximum-likelihood estimation is more suited to test the causality. He argues that conclusions drawn from least squares causality tests may lead to an erroneous claim that a statistically significant causal relation exists. Vilassuso points out that, "*Misleading inference associated with least squares may be traced to two explanations. First, because the set of regressors in a VAR includes lagged dependent variables, least-squares standard errors are not consistent and may not support correct statistical inference.....A second explanation for the unsatisfactory performance of least-squares causality tests traces to a failure to adequately differentiate between causality in mean and causality in variance*" (p. 26).

implies that the short-term changes in the level of each of these indicators of stock market development is in part responsible for future changes in real per capita GDP growth, and in each short-term, economic growth is adjusting to the previous period's imbalance between these indicators of stock market development and per capita real GDP growth.

On the other hand, of the six stock market development indicators tested by Johansen's cointegrating vectors causality approach and included in Table (6.6), three reject the hypothesis of no-causality from per capita real GDP growth to stock market development through both the error-correction terms and the dynamic terms. These indicators are market capitalisation, value-traded and turnover-volatility ratios. In the case of the turnover and traded-volatility ratios, there is also evidence of causation from per capita real GDP growth to these indicators but emanating only from the error-correction terms in which the lag dynamics terms appear statistically insignificant at the ten-percent level. In the case of market volatility, however, there is no evidence either from the error-correction term or the dynamic term of reverse causation from per capita real GDP growth to this indicator.

Table 6.6: Granger-Causality Test Results: The Johansen Procedure

(1) Granger-causality between Per capita real GDP growth (x_1) and market capitalisation ratio (x_2)				
Null Hypothesis:	x_2 does not Granger-cause x_1		x_2 does not Granger-cause x_1	
	t_1=3.939*	F_1=3.914**	t_2=2.322**	F_2=6.634*
(2) Granger-causality between Per capita real GDP growth (x_1) and value traded ratio (x_2)				
Null Hypothesis:	x_2 does not Granger-cause x_1		x_2 does not Granger-cause x_1	
	t_1=2.549**	F_1=3.911**	t_2=2.095**	F_2=3.508**
(3) Granger-causality between Per capita real GDP growth (x_1) and turnover ratio (x_2)				
Null Hypothesis:	x_2 does not Granger-cause x_1		x_2 does not Granger-cause x_1	
	t_1=2.317**	F_1=3.520**	t_2=1.166	F_2=7.273*
(4) Granger-causality between Per capita real GDP growth (x_1) and traded-volatility ratio (x_2)				
Null Hypothesis:	x_2 does not Granger-cause x_1		x_2 does not Granger-cause x_1	
	t_1=2.156**	F_1=3.160**	t_2=1.305	F_2=6.802*
(5) Granger-causality between Per capita real GDP growth (x_1) and turnover-volatility ratio (x_2)				
Null Hypothesis:	x_2 does not Granger-cause x_1		x_2 does not Granger-cause x_1	
	t_1=1.982***	F_1=4.772**	t_2=3.671*	F_2=9.999*
(6) Granger-causality between Per capita real GDP growth (x_1) and market volatility (x_2)				
Null Hypothesis:	x_2 does not Granger-cause x_1		x_2 does not Granger-cause x_1	
	t_1=3.232*	F_1=4.772**	t_2=1.069	F_2=2.383

[a] "*", "**", "***" indicates significance at the 1%, 5% and 10%, respectively. The number in parentheses are degrees of freedom.

To sum up, we report in Table (6.7) the test results from cointegation and causality. The Johansen procedures causality tests are based on the Johansen cointegrating vectors; in other cases we report the results of causality based either on Engle-Granger (if the procedure detects cointegration) or the first difference VAR-based tests. As can be seen, while the evidence from this chapter largely supports the view that there is a stable, long-term equilibrium relationship between the evolution of stock market development and the evolution of economic growth, it provides no support for the view that the stock market is a leading sector in the process of Jordan's economic development. Most of the evidence, however, supports the view that the relation between stock market development and economic growth in Jordan is bi-directional. Higher development in the stock market causes higher real economic growth. High economic growth in turn promotes development in the stock market. As income increases, its cyclical component such as the volume of savings should impact stock market development. This result may reflect the fact that the open stock market to both domestic and foreign investors may be beneficial to economic growth.

Table 6.7: Summary Results, Contegration and Causality

Stock Market Development Indicators	Tests using Engle-Granger Procedure			Tests using Johansen Procedure		
	Cointegration	Does Market Causes Growth?	Does Growth Causes Market?	Cointegration	Does Market Causes Growth?	Does Growth Causes Market
Market Capitalisation Ratio	Yes	Yes	Yes	Yes	Yes	Yes
Turnover Ratio	Yes	Yes	Yes	Yes	Yes	Yes
Value Traded Ratio	Yes	Yes	Yes	Yes	Yes	Yes
Turnover-Volatility Ratio	Yes	Yes	Yes	Yes	Yes	Yes
Traded-Volatility Ratio	Yes	Yes	Yes	Yes	Yes	Yes
Volatility	NO	NO	Yes	Yes	Yes	No

6.6 Summary and Conclusion

In this chapter, we have attempted to investigate empirically the long-run causality between stock market development and economic growth in Jordan. In particular, we have attempted to answer the following question: is the stock market a leading sector in the process of economic development of Jordan? Or is it a two-way causation? The causality issue was investigated

using recent time-series techniques and utilising six proxies of stock market development that are most commonly used by academics and practitioners.

Following Granger (1988), Sims *et al*, (1990), and Toda and Phillips (1993), since cointegration has implications for the way causality testing is conducted, the causality tests are performed within a framework based on unit-root testing and cointegration. The advantage of cointegration is the identification of a stable long-term relationship between the stock market development indicators and economic growth, which could be interesting from a theoretical point of view. The cointegration tests used are based on both the Engle-Granger (1987) two-step procedure and the Johansen (1988) maximum-likelihood method. Where we found the cointegration, we used cointegration vector obtained from each technique in error-correction model (ECM) based causality tests, and then we performed two types of causality test, depending on the sources of causation. The first type related to the joint significance of lagged dynamic terms and the second was a test of statistical significance of the cointegrating vector terms.

The evidence presented in both Engle-Granger and Johansen cointegration tests support the view that there is a short- and long-run relationship between stock market development and economic growth in Jordan. These findings are consistent with the theoretical predictions of both the finance-growth literature and endogenous growth literatures. On the other hand, there was no evidence to support the view that the stock market in Jordan is a leading sector in the process of the country's economic development. In particular, the evidence seems to favour the conclusion that the relationship between stock market development and economic growth is bi-directional. This implies that there is a feedback effect between stock market development and economic growth in Jordan. This important finding is highly consistent with the views of Patrick (1966) and St Hill (1992), as well as with a number of endogenous growth models such as those of Greenwood and Jovanovic (1990), Berthelemy and Varoudakis (1996), Greenwood and Smith (1997) and Boyd and Smith (1998), which predict a two-way causality between financial development and economic growth.

Overall, the findings in this chapter have important policy implications for Jordan and other developing countries that have a similar economic structure. The evidence indicates that

economic development plays an important role in stock market development. Thus, it is important to liberalise the economy when undertaking financial liberalisation, and in order to promote the development of the stock market, Jordan can encourage economic growth by means of the appropriate policies.

Chapter VII

Microeconomic Evidence: Stock Market Development and Firms Growth

7.1 Introduction

In the last two chapters we have examined the relationship between the level of stock market development and its links with macroeconomic out-turns for the economic growth process in Jordan. In this chapter we investigate the interaction between stock market development and economic growth in Jordan using micro data. Specifically, we provide a firm-level test of the hypothesis that the development of the stock market is an important determinant of economic growth in Jordan. This is the first study which attempts to examine empirically the effect of stock market development on economic growth using firm-level data within a specific country experience. Firm-level analysis is important because in an environment with uncertainty and market imperfections, the manner in which the firm finances its operation influences and is affected by the level and efficiency of its investment. By mitigating the adverse consequences of market imperfection[1], financial markets can potentially influence the dynamics of growth at the micro level. Financial markets can mitigate these problems by performing various functions. They aggregate and mobilise capital, enhance liquidity, provide risk pooling and sharing services, assess and select projects and management through producing information, and monitor inside decision making.

In this chapter we construct a simple empirical model in which stock market development affects firm growth through enhancing productivity growth within the firm. Particularly, utilising corporate financial theory, we argue that stock markets provide risk sharing, enhance liquidity, and promote responsible governance and control through providing

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[1] These capital market imperfections can take many forms. Technological and incentive frictions can exist, which prevent individuals from having access to economic of scale, increase the costs of acquiring information, increase asymmetric information and create incomplete contracts. In addition, restriction on

outside investors with a variety of mechanisms for monitoring inside decision makers. This, in turn, facilitates technological innovations and improves the economic efficiency with which the firm utilises its resources, and therefore, contributes to higher productivity growth[2]. In our empirical model, we assume that the degree to which firms benefit from stock market functions depends on how much the firm relies on the stock market to finance its investment. Thus, our empirical model predicts that firms which rely more on equity finance will benefit more from stock market development.

Empirically, the particular questions we attempt to address in this chapter are as follows. Do firms that depend heavily on equity finance grow at a faster rate than firms that do not depend heavily on equity finance when the stock market becomes more developed? Are the banks or the stock market better at providing financial services and promoting the growth of Jordanian firms, or is the overall financial development critically important in influencing the firms' growth? Are the banking sector and the stock market complements in providing financial services to the corporate sector in Jordan? Do developments within the banking sector and the stock market have different effects on the growth of large and small firms?

Our analysis is carried out with the Generalised Method of Moments (GMM) for panel data utilising instrumental variables. One advantage of using panel data over congenital cross-sectional or time-series data sets is that it usually gives a large number of observations, which increases the degrees of freedom and reduces the multicollinearity among explanatory variables, hence improving the efficiency of econometric estimates[3]. Furthermore, it is generally argued that the production function may actually differ across firms. It is empirically difficult for single cross-sectional approach to allow for such differences in the production function. Thus, the most important advantage in using the panel data approach is that it allows for the difference in the production function across firms in the form of unobservable individual "*firm effects*".

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international capital flows, lack of international market integration and high transaction costs will effect the efficient allocation of capital.

[2] In addition, stock market development also directly impacts on the rate of physical capital accumulation.

[3] For more detailed discussion see for example Hsiao (1985, 1986); Appelpe *et al.*, (1992); Ahn and Schmidt (1999); and Baltagi (2000).

We use two GMM dynamic panel estimators. These estimators specifically address the econometric problems induced by firm specific effects and predetermined explanatory variables (endogeneity). The fact that the model includes fixed effects, lag dependent variables and the possibility of predetermined explanatory variables implies endogeneity and autocorrelation. Moreover, using this type of data may give rise to heteroscedasticity. However, GMM enables consistent estimation in spite of heteroscedasticity and autocorrelation (Stock 2001), which would blur the results if a method like least squares, fixed or within estimators was used (Johnston and Dinardo, 1997; Ahn and Schmidt, 1999; Nerlove, 2000; Blundell, *et al.,* 2000; and Andrews and Lu, 2001). Furthermore, GMM is particularly suitable for panels containing many firms and a small number of time periods (Bond, *et al.*, 1999).

In order to address the possible omitted variable bias created by firm-specific effects in the first GMM dynamic panel estimator we difference the regression equation. Thus, we take differences to eliminate firm-specific effects and thereby remove variable bias. Then, we instrument the right-hand side variables (the differenced values) of the original regressors using lagged values of original regressors (measured in levels) as instruments. This last step removes the inconsistency arising from simultaneity bias.

The problem with the difference estimator is that it generally suffers from weak instruments, especially, lagged values of the levels of the original regressors which frequently make weak instruments for the differenced values of the regressors used in panel equations. This shortcoming may induce large biases in finite samples and poor precision (Blundell and Bond, 1998a). To mitigate this problem, we use a system GMM estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998b). This estimator controls for the presence of unobserved firm-specific effects and for the endogeneity of the current-dated explanatory variables. Besides the difference panel equations where the instruments are lagged levels of the original regressors, this estimator simultaneously estimates the original levels equation where the instruments are lagged values of the differenced regressors. Thus, to investigate our issues in this chapter, we use the GMM dynamic panel technique with both a difference and a system estimator[4].

[4] The GMM estimates that we report are computed using DPD99 for OX (see Doornik, *et al.,* 1999).

The sequence of the rest of the chapter is as follows. Section 7.2 provides a review of the previous empirical literature. Section 7.3 outlines the theoretical framework. Section 7.4 describes the empirical model and the hypotheses to be investigated. Section 7.5 provides a detailed description of the econometric methods which will be used to estimate the model. Section 7.6 presents the data. Section 7.7 presents empirical results based on the estimation of a dynamic panel data model. Section 7.8 provides a conclusion to this chapter.

7.2 Previous Empirical Literature

Empirical literature on the relationship between stock market development and firms' growth has been rather limited. The lack of empirical literature in this field may be attributed to the unavailability of sufficient data at the firm level (especially for developing countries). Nevertheless, recently some research has been conducted. Demirguc-Kunt and Maksimovic (1998, 2000) provide micro-level support for the proposition that financial development facilitates economic growth using firm-level data from developed and developing countries. In their work they used firm-level data and they focused on international (between-country) differences rather than on national, between-firm differences. Particularly, for each firm in their sample they estimate a financial planning model to obtain the maximum growth rate (defined as sales growth) the firm could attain without access to long-term finance (long-term debt plus equity). Then they estimate how the proportion of firms in each country whose rate of growth exceeds the predicted rate depends on the development of the stock market and the banking sector. In particular, they test the hypothesis that the more developed the market, the greater the proportion of firms able to grow at rates in excess of the predicted rate.

Using two indicators for stock market development, the ratio of market capitalisation to GDP and turnover ratio, and one indicator for banking sector development, the ratio of asset deposit banks to GDP, Demirguc-Kunt and Maksimovic run cross-country regressions and find that there is a strong relationship between the development of financial markets and banks and the proportion of firms growing at rates requiring long-term external financing. They concluded that firms in countries that have easier access to external funds (e.g. active stock markets and high ratings for compliance with legal norms) tend to grow faster.

Rajan and Zingales (1998) have also investigated the relationship between financial development and industry growth. In particular, they test whether industries that depend on external finance for their growth are relatively "*better off*" in economies with well-developed financial markets. They identify an industry's need for external finance from data on U.S industries and then they examine whether the industries that are more dependent on external finance grow faster in countries that initially have better developed financial markets and institutions. Using the sum of the ratio of total market capitalisation to GDP and the ratio of domestic credit to GDP as an indicator for financial development, Rajan and Zingales run cross-sectional regressions on a panel data consisting of 42 developed and developing countries and 36 US industries throughout the 1980s. They find that industries which rely more heavily on external finance grow faster in countries with a better-developed financial system. They also find that the intensity of investment in industries dependent on external finance is disproportionately higher in countries with more developed financial markets.

Based on the methodology of Rajan and Zingales (1998) and their data set, Beck and Levine (2000) examined the following issues in addition to Rajan and Zingales hypothesis. They investigated whether externally dependent industries grow faster in bank-based or market-based financial systems or whether it is the overall level of financial development that enhances the growth of externally dependent industries. They also examined whether bank-based or market-based financial systems are better at fostering new firm formation or existing firm expansion, or whether it is the overall level of financial development that is critical for the emergences of new firms and the expansion of existing ones. Using the Rajan and Zingales (1998) data on a panel of 42 countries (developed and developing countries) and 36 US industries over the 1980s, they find evidence that confirm the results obtained by Rajan and Zingales (1998); industries that rely heavily on external finance grow faster in countries with a better-developed financial system. They also find that industries that depend heavily on external finance do not grow faster in either bank-based or market-based financial systems; they grow faster in economies with higher levels of overall financial development. Furthermore, there is not a robust relationship between the degree of bank-based or market-based financial systems in a country and the rate of new firm formation or existing firm expansion. Overall financial development explains cross-country variation in the growth in the number of establishments.

The work of Rajan and Zingales (1998) and Beck and Levine (2000), however, suffer from several shortcomings in their empirical method that we address in this chapter. First, they do not distinguish between external debt and equity finance. We argue that different firms may be dependent on different types of finance. The theories of corporate finance suggest that banking finance will be more prevalent in industries requiring active screening and monitoring and stock market finance high risk industries. In contrast, in our methodology we split external finance into bank and stock market dependence to distinguish between firms that are susceptible to information asymmetries and to risk. Second, they used aggregate industry data rather than firm-specific data and we use firm specific data. Third, their test is based on the unrealistic assumption that financial dependence of U.S industries is a good proxy for the demand for external funds in other countries. It might be argued that the amount of cash flow produced by firms in a certain industry is likely to be dissimilar worldwide. In addition, the stage of a product cycle and the demand for external funds that arise as a result of technological shocks in other countries, especially developing countries, are different to those of corresponding U.S industries. In contrast, we base our study on the information in relation to external need (debt and equity finance) of each individual firm in the sample. Finally, another important shortcoming in these works is that by basing analysis on aggregate industry data they assume that all the firms in each industry are traded in the stock markets and may benefit from financial services provided by stock markets[5]. Actually this is not true, especially in developing countries in which few firms are listed and traded in the stock markets. To address this shortcoming, we base our work on a sample of industrial firms listed in the stock market.

In another related study Demirguc-Kunt and Maksimovic (1999) have examined the amount and maturity of the debt of firms in 30 countries during the period 1980-91, they related this to turnover on stock markets and bank assets to GDP ratios. They find that stock market turnover is associated with more long-term debt amongst large but not small firms. They also find that bank sector development is associated with more long-term debt of small but not large firms. Their results are consistent with the argument that banks are particularly important in the financing of small firms and the stock market in the financing of large firms. Carlin and Mayer (1999) used data from 27 industries in 20 OECD

[5] To benefit from financial services provided by stock market, the firm should actually be traded in the market.

countries over the period 1970-1995. They find that equity financed industries tend to grow faster, carry out more R&D, and employ higher skilled workers in countries with relatively better accounting standards. Unlike equity-financed industries, Carlin and Mayer find that bank-financed industries grow more slowly in countries with a developed financial infrastructure and tend to undertake less R&D. Finally, Love (2000) studies the relationship between financial development and financial constraints by using a firm level data for 40 countries. He finds a strong negative relationship between the sensitivity of investment to the availability of internal funds and an indicator of financial market development, and concludes that financial development reduces the effect of financing constraints on investment. His result provides evidence for the hypothesis that financial development reduces imperfections *i.e.,* informational asymmetries in financial markets which leads to an improvement in the allocation of capital and ultimately to a higher level of growth[6].

In addition to what we have mentioned above, there are a number of common shortcomings that can be seen in previous work in this area that we will address in this chapter. First, all these studies perform Barro-type reduced form growth regressions (single cross-country regressions). They have a single set of data points for each country averaging, ten or five years of data into a single data point. This method loses information that could be country-specific, firm specific, and/or time-specific. Furthermore, as we have mentioned in detail in Chapter V, this method suffers from measurement, statistical and conceptual problems. In terms of measurement problems, since they have firms data for both the developing and developed countries which is collected from different sources, officials in different parts of the world some times define, collect, and measure variables very differently, and hence, their data set has measurement inconsistencies across countries. Thus, we should interpret the coefficients from their analysis very cautiously. When averaging over long periods many changes are occurring simultaneously: countries change policies, economic experience business cycles, and governments rise and fall. Thus, aggregation may blur important events that may affect firms' behaviour differently across countries. Furthermore, all previous studies by running single cross-country regressions are based on the assumption that firms across countries have identical

[6] In the most recent study in this field, Wurgler (2000) uses industrial data for 65-country and runs cross-country regressions, he finds that the development of financial markets, as measured by the size of the domestic stock and credit markets relative to GDP, are associated with a better allocation of capital.

production functions. This assumption is surely wrong. It is generally felt that production function of firms may actually differ across countries, and more than that it may differ across firms within a country. In contrast, we address these shortcomings by focusing only on one country's experience, that of Jordan, using a panel data analysis framework.

Secondly, none of these studies have used a formal model to links firm growth to financial market development whilst taking into account other important elements of firm growth such as labour and capital growth, ownership structure and competition in product markets. In this study we propose and implement a simple plausible empirical model taking into account, in addition to the financial market development effects, other important factors that may affect a firm's growth. Thirdly, none of the previous literature examines whether banking sector and stock market development have different effects on firms' growth depending on their size. Finally, most of these studies analyse the impact of financial development on growth without taking into account the possible endogeneity of the level of financial development. Financial markets may develop in anticipation of the financial needs of the industries or the firms. In this study, we address this shortcoming by used the more recent econometric methods (GMM dynamic panel techniques) to estimate the dynamic panel model used here that controls for simultaneity bias and reverse causality.

7.3 Theoretical Framework

The corporate finance theory provides a rich analytical framework illuminating the links between investment and finance at the micro-level. In these models, this link is arising as a consequence of market and contractual imperfections. Thus, financial markets and institutions arise to mitigate informational problems and transaction frictions. To do this, financial markets perform various functions. They aggregate and mobilise capital, enhance liquidity, provide risk sharing and pooling, assess and select projects and management through producing information, and monitoring inside decisions making.

The financial markets play a key role in mobilising and allocating resources to their efficient use. They aggregate small savings of numerous investors for use by agents with entrepreneurial and managerial talents who need funds for large-scale capital investment. In doing so, they also provide investors as well as entrepreneurs with risk-pooling and sharing facilities. By enhancing capital mobilisation and providing risk pooling and

sharing, financial markets enable the undertaking of risky technological innovations and therefore, improve firm productivity growth.

As we have mentioned in Chapter IV, numerous theoretical studies directly address the link between financial markets and firms' technological choices. In brief, Bencivenga *et al.*, (1995, 1996) argue that an especial feature of industrial development is the adoption of technologies that require large-scale illiquid capital investment. Financial markets that provide risk sharing and liquidity possibilities make it economically feasible to implement such technologies. Bencivenga and Smith (1991) argue that financial markets promote growth as a means for reducing liquidity risk, thereby increasing funds available for productive capital. Saint-Paul (1992) presents a model in which financial markets interact with the technological choice of the firm in that financial markets allow riskier but more productive technologies, and technological choice, in turn, affects the viability of financial markets. Greenwood and Jovanovic (1990) argue that financial intermediates influence technological choice through their risk sharing and pooling services. They facilitate high-yield investments and thereby growth by pooling idiosyncratic investment risks across a large number of investors. Levine (1991), Fulgieri and Rovelli (1998), and others argue that greater liquidity of stock markets will induce a shift to long-term, higher-return technologies. Finally, Boyd and Smith (1998) assert that the absence of stock markets would prevent firms from employing their most productive capital technologies.

From above, we can conclude that financial markets and technology are strategically complementary in that both are instruments for risk sharing and liquidity providing. In conditions where stock markets provide limited liquidity and poor risk sharing services, diversification and liquidity occur through the choice of short term investment projects that uses inferior technologies which are less specialised and less productive.

Another important function of financial markets is facilitating responsible governance and control within firms. In a world of uncertainty and incomplete contacting, problems of imperfect information and moral hazard may prevent the first-best value-maximising investment behaviour. Investment and operations in the firm would be prone to agency problems in which agents engage in value destroying behaviour. The governance role of financial markets constitutes information production and monitoring that mitigate the consequence of costly information and moral hazard. To the extent that financial markets

mitigate such problems, they would have an effect on a firm's economic efficiency[7] and therefore productivity growth[8].

Stock markets have a vital role in processing information about firms (Grossman 1976; Grossman and Stiglitiz, 1980; Holmstrom and Tirol, 1993; Subrahmanyam and Titman, 1999; Morck, *et al.*, 2000; Stulz, 2000; Pagano and Zingales, 2000; Morck, *et al.*, 2000; and others). Trading activity among participants produces information which can be conveyed through price signals. This information production role is very important for entrepreneurs in augmenting their understanding of the market's environment. It provides the knowledge about how investors evaluate both their own and the competitors' current decisions, future plans and managerial performance (Dow and Gorton, 1997; and Subrahmanyam and Titman, 1999)[9]. It enhances entrepreneurs' knowledge about efficient firms and their ability to develop more efficient production methods. Thus, the link between this information function and firm productivity growth is straightforward: simply put, developed stock markets that generate better information enable firms to make better investment decisions.

It is important to note here that, financial institutions such as banks and other lending institutions also provide an information production function. The information created by these institutions, however, is not as widely disseminated and the firms are not accessed as continuously and efficiently as they are when traded in stock markets. Most of the information collected by banks remains as private assets. On the contrary, stock markets evaluate firms on a daily basis, aggregate information across the board and provide it freely available to the public. Thus, from this point of view, stock markets are certainly more significant than banks.

Stock markets and institutions also may impact on firms' productivity growth through their governance function. As is well known, contractual relationships are prone to severe agency problems due to conflicts of interest among stakeholders in the firms, including

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[7] Economic efficiency is defined as the degree to which the firm's observed behavioural goal diverges from its optimum.

[8] See for example Lehmann (1997) and Stulz (2000).

[9] This information is also useful to creditors. It makes lending to a publicly quoted firm less risky and therefore reduces the costs of debt finance. As a result, the existence of an active stock market increases the ability of firms to obtain long-term credit at lower costs (Demirguc-Kunt and Maksimovic, 1996, 1999).

those between management and shareholders that may result in sub-optimal managerial actions. Stock markets play an important function in controlling such sub-optimal behaviour. Stock markets can do this in a number of ways. First, they generate information to evaluate the quality of past managerial decisions (Dow and Gorton, 1997). Second, information in stock prices allows managerial incentive schemes (Holmstrom and Tirol, 1993). Third, the threat of takeover through the facilitation of stock markets mitigates managerial inefficiencies and create incentive for managers to work harder make better investments decisions to reduces the probability that their firms may take over in the future. Thus, stock markets can have an effect on firms' economic efficiency (through their governance role) by inducing agents (management) to perform as close to the value maximising first best in their investment and operational decisions.

From all of the above we can conclude that the degree to which stock markets influence firm growth depends mainly on how effectively they carry out both its allocation and governance functions. A stock market that merely serves as a conduit of capital provision would not be effective in accelerating growth; equally important is the information production and control role. Capital mobilising and information production have a critical role in enhancing firm growth through impact on the productivity growth component; facilitation of risky technological advances and improving economic efficiency with which the firm utilises its resources.

7.4 Empirical Model

As we have mentioned before, the main objective of this chapter is to provide a micro-level test of the hypothesis that the development of the stock market is an important determinant of economic growth in Jordan. Utilising the theoretical framework provided above, in this section we propose and develop a new simple plausible empirical model for firm growth that incorporates the effects of financial markets in addition to other important factors that may affect firm growth.

Following microeconomic growth theory, we postulate that the firm employs a bundle of resources or inputs to produce output, we base this on the traditional production function which consists of four variables: output (Y), capital (K), labour (L) and the total factor

productivity (A) which has two components: economic efficiency and the level of technological progress. The production function is defined as follows[10]:

$$Y_{i,t} = f(K_{i,t} A_{i,t}, L_{i,t}) \qquad (7.1)$$

where i and t denote firm and time subscript, respectively. Differentiating the above equation with respect to time we obtain:

$$\dot{Y}_{i,t} = \frac{\partial Y_{i,t}}{\partial K_{i,t}} \dot{K}_{i,t} + \frac{\partial Y_{i,t}}{\partial A_{i,t}} \dot{A}_{i,t} + \frac{\partial Y_{i,t}}{\partial L_{i,t}} \dot{L}_{i,t} \qquad (7.2)$$

where a dot denotes a time derivative and $\partial Y_{i,t}/\partial K_{i,t}$, and $\partial Y_{i,t}/\partial A_{i,t}$ denote $[\partial Y_{i,t}/\partial(A_{i,t} K_{i,t})] A_{i,t}$ and $[\partial Y_{i,t}/\partial(A_{i,t} K_{i,t})] K_{i,t}$, respectively. Dividing both sides by $Y_{i,t}$ and rewriting yields:

$$\frac{\dot{Y}_{i,t}}{Y_{i,t}} = \frac{K_{i,t}}{Y_{i,t}} \frac{\partial Y_{i,t}}{\partial K_{i,t}} \frac{\dot{K}_{i,t}}{K_{i,t}} + \frac{A_{i,t}}{Y_{i,t}} \frac{\partial Y_{i,t}}{\partial A_{i,t}} \frac{\dot{A}_{i,t}}{A_{i,t}} + \frac{L_{i,t}}{Y_{i,t}} \frac{\partial Y_{i,t}}{\partial L_{i,t}} \frac{\dot{L}_{i,t}}{L_{i,t}}$$

$$\equiv \beta_i^K \frac{\dot{K}_{i,t}}{K_{i,t}} + R_{i,t} + \beta_i^L \frac{\dot{L}_{i,t}}{L_{i,t}} \qquad (7.3)$$

where β_i^K and β_i^L are the elasticity of output with respect to capital (K) and labour (L), respectively. $R_{i,t}$ reflects the total source of growth other than the contribution of capital and labour, which represents what is called growth in total factor productivity (TFP).

Based on equation (7.3) one can distinguish between growth that follows from increases in total factor productivity and growth that arises from increases in the firm's factor stock. This later growth includes the standard factors of production, labour and capital. Factor productivity may change due to shifts in the underlying technology and changes in the economic efficiency of the production process. Consistent with the theoretical framework presented in the last section in which stock markets may effect firm growth mainly through facilitating risky technological advances and improving economic efficiency with which the firm utilise its resources, we extend the firm growth model (equation 7.3) to incorporate stock market effects and other elements by using the hypothesis that $R_{i,t}$ can be

[10] The derivative here follows Barro (1998).

expressed as a function of the stock market factor ($SMF_{i,t}$) and a vector of variable $X_{i,t}$[11]. Since the degree to which the firm benefits from the stock market is based on the degree of its presence in the stock market through raising equity, the stock market factor ($SMF_{i,t}$) in total factor productivity growth will therefore be the interaction between the stock market development and the firm's dependence on equity finance. Thus, our hypothesis is based on the argument that firms that are heavily users of equity finance should benefit disproportionately more from greater stock market development than firms that are not heavy users of equity finance.

That is to say $R_{i,t}$ can be expressed as follows:

$$R_{i,t} = f(SMF_{i,t}, X_{i,t}) \qquad (7.4)$$

To be able to isolate the effects of the stock market effect, the $X_{i,t}$ vector should ideally consist of all other factors that affect firm productivity growth. For example, variables which measure competitive conditions, organisational influence, labour relation, labour market regulations, external network, managerial ability, firm strategy and ownership structure, may be important[12]. However, due to data limitations at the firm level we include only three variables that may affect firm total productivity growth: the age of the firm, the product market competition and the ownership structure.

An effect that might affect productivity is related to learning by doing, which is supposed to be associated with the age of firm (Evan, 1987; Dune and Hughes, 1994; Heshmati, 2000; and Li and Weinberg, 2000). An older firm is expected to become more productive over time if, for instance, it has improved its organisation and learned how to utilise the workers and the capital in the best possible way. On the other hand, an older firm might have become petrified in some sense or might not have as strong an incentive as a younger firm to invest in new technology (Brezis, *et al.*, 1993). Moreover, due to vintage effects, a younger firm might be more productive if its capital stock is more modern than the capital stock of an older firm (Wolff, 1996).

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[11] In fact, stock markets development may also have an impact on the rate of capital accumulation (see for example Lehmann, 1997).

[12] For more detailed discussion about these factors see for example Storey (1994), Delmar (1997), Davidsson and Henrekson (2000), and Loof and Heshmati (2000).

The belief that competition improves company productivity is widespread. According to Nickell, *et al.*, (1997) there are two direct explanations for this influence of competition on the productivity performance of the firms. Firstly, in a competitive environment it is easier for owners or the market to monitor managers[13]. Secondly, more competition will raise the probability of bankruptcy at any given level of managerial effort. So, managers will work harder to avoid this outcome. In addition, competition can encourages productivity growth by increase the incentives to invest in productivity enhancing technology[14]. A number of empirical studies have shed positive light on the impact of competition on the productivity performance of the firms. Nickell (1996) finds that productivity growth in companies is positively correlated with the number of their competitors and negatively correlated with the average level of rents which they generate. Nickell, *et al.,* (1997) also find that average rents normalised on value added (an inverse measure of competition) are negatively related to total factor productivity growth[15]. Here, following Nickell, *et al.,* (1997) we use ex-post rents (profits less capital costs) normalised on value added as an inverse measure of competition[16].

Finally, another important factor that may influence the firm's productivity is its ownership structure. It is argued that managers may be under greater pressure to perform well when there is a significant major shareholder than when the shareholdings are very widely dispersed (Mayer, 1996; and Carlin and Mayer, 1999). Thus, in the presence of dispersed shareholders there is little incentive and power for any one shareholder to control managers. Larger ownership stakes also imply that owners can internalise more of the returns to monitoring and thereby this tends to encourage monitoring. However, empirical studies so far have presented mixed results related to the effect of ownership concentration on firm's performance. Demsetz and Lehn (1985) find no significant correlation between ownership concentration and accounting profit rates for 511 large corporations in USA.

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[13] This view also mentioned by Glen, *et al.,* (2000).

[14] Hay and Liu (1997) and Roberts and Tybout (1996) provide empirical evidence show that increased competition leads to increased technical efficiency. In addition, Brown and Earle (2000, 2001) provide evidence from panel data on 14,961 Russian enterprises that product market competition has strong positive effects on total factor productivity.

[15] Nickell and Nicolitsas (1999), however, find that market share and industry concentration have no effect on the firms' productivity growth.

[16] Other measure of competition which widely used in empirical studies is concentration ratio. This measure, however, does not convey adequate information about the intensity of competition in the economy (Glen, *et al.,* 2000). It may be a high concentration ratio in an industry and yet competition may be intense between oligopolistic firms over market share, new products, design, sales, ect. Concentration ratio also does not take in consideration foreign competitors (Nickell, *et al.,* 1997).

McConnell and Servaes (1990) find in a sample of more than 1,000 firms that corporate performance, as measured by Tobin's Q, is positively correlated with the levels of ownership concentration. More recently, Xu and Wang (1997) find that ownership concentration has significant, positive effects on the performance of publicly listed companies in China. Claessens and Djankov (1999a, 1999b) used data on recently privatised firms in the Czech Republic. They find that firms with concentrated ownership, foreign ownership and ownership by non-bank investment funds are more profitable and have higher labour productivity.

Theoretically, both of the schools can find their roots in this literature. Fama (1980), for example, argues that if a firm is viewed as a set of contracts, ownership of the firm is an irrelevant concept. A properly functioning managerial labour market may discipline managers and solve incentive problems caused by the separation between ownership and control. Burkhart *et al.*, (1996) and Shleifer and Vishny (1995) argue that concentrations of ownership may reduce incentives and create conflicts between majority and minority investors. Heinrich (2000) argues that large share ownership stakes imply that ownership portfolios are less well diversified and that owners are more exposed to firm-specific effect risk. This effect tends to encourage owners to shift firm risk towards the firm's manager and hence discourages owners from monitoring. On the other hand, economists argue that ownership structure may matter. For example, Grossman and Hart (1980) show that if a firm's ownership is widely dispersed, no shareholder has adequate incentives to monitor the management closely. Finally, Shleifer and Vishny (1986) develop a model to demonstrate that a certain degree of ownership concentration is desired in order for the takeover market to work more effectively. They also believe that large shareholders may help reduce the free-rider problem for small investors and hence increase corporate control.

Thus, our basic statistical model used to test the impact of the stock market development on the firm's growth is a dynamic panel data model specified as follows:

$$y_{i,t} = \gamma_1 y_{i,t-1} + \gamma_2 GK_{i,t} + \gamma_3 GL_{i,t} + \gamma_4 SMF_{i,t} + \gamma_5 AGE_{i,t} + \gamma_6 COM_{i,t} + \gamma_7 CR_{i,t} + \alpha_i + \alpha_t + \varepsilon_{i,t} \quad (7.5)$$

where $y_{i,t}$ is firm i's growth rate of real value added at time t. Value added is defined as operating profits after depreciation plus wages and interest payments. $GK_{i,t}$ and $GL_{i,t}$ are the growth rate of real capital stock and the number of employees, respectively. The capital

stock is defined as the book value of total assets. The number of employees is used because data does not allow us to use a more precise definition (*e.g.*, total working hours). $SMF_{i,t}$ is the stock market factor measured by multiplying the dependence on equity finance for firm i at time t with the stock market development indicator at time t. A firm's dependence on equity finance is defined as the proportion of the total firm's investment expenditure that has been financed by new equity issues. $AGE_{i,t}$ is defined as the firm age. $COM_{i,t}$ is the inverse competition indicator, defined as the ratio of ex-post rent (profit minus capital cost) to value added. $CR_{i,t}$ is the ownership concentration ratio, measured by the percentage of shares controlled by large shareholders who own 10 percent or more of the firm. α_i is an unobserved firm specific effect and α_t captures any common period specific effects. $\varepsilon_{i,t}$ is the error term, represents those effects which cannot be controlled by the firm, such as business cycle, quality and access to labour, labour market conflicts, measurement errors in the independent variable, and other explanatory variables that have been omitted[17]. It is assumed to be independently and identical normally distributed with zero mean and constant variance, $\varepsilon_{it} \approx iidN(0,\sigma_\varepsilon^2))$. Absence of serial correlation is assisted by the inclusion of dynamics in the form of a lagged dependent variable. The literature on lagged dependent variable is vast and varied; some of the most important articles are those by Lee *et al.*, (1996) and Islam (1995). Following Islam (1995) we included the lag (one-year) of the dependent variable in our model to capture the fact that whenever factors of production are changed it typically takes some time for output to reach its new long-run level. For example, if new capital goods are purchased it may take a considerable time before the machines are fully effective.

As mentioned before, the main objective of this chapter is to test the hypothesis that firms that are heavily dependent on equity finance, with more development in the stock market, grow faster than firms that are not heavily dependent on equity finance. Thus, our

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[17] The basic assumption of the panel models is that, conditional on the observed explanatory variables, the effect of all omitted variables are driven by three types of variables: individual time invariant, period individual-invariant, and individual time-varying variables. The individual time-invariant variables are variables that are the same for a given cross-sectional unit through time but vary across-sectional units. The period individual-invariant variables are variables that are the same for all cross sectional units at any given point in time but that vary through time. The individual time-varying variables are variables that vary across-sectional units at a given point in time and also exhibit variations through time. Thus, the residual consists of three components; $\alpha_{i,}$ represents the effects of the omitted variables that are specific to individual cross-sectional units but stay constant over time, α_t represents the effect of those omitted variables that are specific to each time period but are constant for all cross-sectional units and $\varepsilon_{i,t}$ represents the effects of the omitted

explanatory variable whose influences we are interested in, is the interaction between a firm's dependence on equity finance and the stock market development indicator ($SMF_{i,t}$). If the coefficient estimated of this variable enters positively and statistically significantly in the firm growth regression, this implies that firms that are more dependent on equity funds to finance their investment opportunity will be *better off* when the stock market becomes more developed.

The stock market and the banking sector are important as direct sources of capital and mechanisms for monitoring that the investors have access to information about firms' activities. However, as Levine (1991) argues, capital raised through equity issues is long term, while the investor at short notice, without impacting the firm's projects, can liquidate shares[18]. By contrast, if the firm finances with non-tradable, finite maturity debt held by banks, shocks to the banks may be transmitted on to the firm and force liquidation of long-term projects. Stock markets create a separation between the liquidity shocks of investors and the investment needs of firms, to the extent that the latter can take a longer-term view and invest more efficiently. Stiglitz (1991) also argues that capital raised through equity issues has two related distinct advantage over debt. "*Risk is shared with provider of capital, and there is no fixed obligation for repaying the funds. Thus, if times are bad, payments to the providers of capital are suspended. The firm will not face bankruptcy, and will not be forced to take the extreme measures intended to slave off bankruptcy. … because risks are shared between the entrepreneur and the provider of capital, the firm will not normally cut back production as much as it would with debt finance, if there is a downturn in the economy*"(p.7). Stock markets also may be better at providing capital for new ventures and financing risky technical innovations and may mobilise additional financial resources for investment (Pagano, 1993b; and Pagano and Zingales, 2000). Boyd and Smith (1998) show that stock markets might be act complement with debt markets by making them operate more efficiency through make debt capital issue cheaper.

An alternative view is that managers who are constantly evaluated by the stock market tend to take the short-term view and, therefore, it is better that they obtain finance for long-term projects from the banking sector. Myers and Majluf (1984) in their model focus on the

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variables that are peculiar to both the individual units and time periods which are characterised by an independently identically distributed random variable with mean zero and constant variance.

[18] See Chapter IV for a more detailed discussion.

distinction between external equity and debt finance. They argue that because debt finance is less sensitive to asymmetries of information between the firm and investors, it will be preferred to equity financing when such asymmetries are significant. In addition to the main objective of this chapter we can examine an important issue; whether the stock market and banking sector is a substitute or a complement in providing financial services to Jordanian firms and whether the banking sector or the stock market is better at facilitating the firms` growth.

In order to examine the above issue, we require a specification to account for the effect of banking sector development. Consequently, we added to the basic regression another financial variable ($DMF_{i,t}$), measured by multiplying the dependence on debt finance for firm i at time t by the banking sector development indicator at time t. A firm's dependence on debt finance is defined as the proportion of the total firm's investment expenditure that has been financed by debt (short and long-term debt). If the coefficient estimated for the interaction of equity dependence and the stock market development is still significant after including the new financial variable ($DMF_{i,t}$), this implies that the stock market and the banking sector are complementary rather than substitutes providing different financial services to the Jordanian corporate sector. The magnitudes of the estimated coefficients of the two variables (the stock market and the debt market factors) provide us with an indicator about the importance of the stock market development compared with the banking sector development in fostering the firm's growth.

It is likely that the stock market and the banking sector development have different effects on large and small firms. Griliches (1988), Rajan and Zingales (1995) and Laeven (2000) argue that the information constraints are likely to have a greater impact on small firms than on large firms, partly because large firms tend to be mature and have more credible relations with providers of firms. This theoretical approach implies that small firms are likely to be the most dependent on internal finance and the least on external finance. Changes in the development of financial markets are thus likely to have a more significant influence on the growth of larger firms. Another argument for size is that information asymmetries between insiders in a firm and the stock market are lower for large firms. Therefore, under this argument large firms are likely to be more dependent on equity finance and less dependent on debt finance (Rajan and Zingales, 1995; Pagano and Zingales, 2000; Paranque, 2000; and Shin and Stulz, 2000). Thus, changes in stock markets

development are likely to have a more significant influence on larger firms' growth than on the growth of smaller firms.

To investigate the hypothesises that the stock market and banking sector development may have different effects on large and small firms' growth; that the stock market development has greater affects on large firms than small firms and that the banking sector development effects small firms more than large firms, we create a dummy variable (DUM) equal to one if the firm is large and zero if small. The large firm is defined as the firm that has total assets above the median of the total assets of the firm sample. We interacted this dummy variable with the stock market factor (SMF) and the debt market factor (DMF). We then included these two new variables in the regression equation. If the estimated coefficients of DUM*SMF and/or DUM*DMF enter significantly in the regressions estimate, this implies that the stock market and banks have different effects on large and small firms. If the coefficient of DUM*SMF enters positive and significant, this implies that the stock market development impacts on large firms more than small firms that are dependent on equity finance. If the coefficient of DUM*DMF enters negative and significant, it implies that the banking sector development effects small firms more than large firms that are dependent on debt finance.

7.5 Estimation Methods

This section describes the two econometrics techniques that we use to estimates our dynamic panel data regressions. We use these techniques mainly to control the simultaneity biases that may arise from the joint determination of the financial markets development and firm's growth (endogeneity of the level of the financial market development) and also to eliminate any omitted variable bias induce by firm-specific effects.

As well now known estimating dynamic panel regression models which contain many firms and a small number of time periods using the OLS estimator are not consistent because of the following econometric problems; the possible correlation between unobserved firm-specific effects and other explanatory variables, the potential correlation between the lagged endogenous variables and residuals and the possibility that explanatory variables are not exogenous. In panel data estimation, consistent estimates of coefficients

depend on the stochastic properties of the model. If the error term is orthogonal to the right hand side variables, an OLS estimator will be consistent. On the other hand if all explanatory variables are strictly exogenous, then a fixed effect estimator will be consistent. The equation model we estimate here contains unobservable firm fixed effects, which are correlated with explanatory variables as well as endogenous variables. Hence, the orthogonality conditions between the error terms and the variables are not likely to be met for an OLS or fixed effect estimator to produce consistent estimators (Blundell and Bond, 1998a,b; and Nerlove, 2000).

One can achieve the orthogonality conditions under certain circumstances through appropriate differencing of the equation. However, in our model we have a lagged dependent variable as well as possible endogenous variables as regressors. Therefore, the error terms in the differenced equation are correlated with the lagged dependent variable through contemporaneous terms in period t+j even if there was no unobserved firm or time fixed effects that correlate with the regressors. Neither the fixed effect estimator nor the OLS will produce consistent estimates. An instrumental variable estimator that can account for corrected fixed effects as well as account for the possibility of endogeneity of regressors is therefore needed. Chamberlian (1984) has proposed a generalised method of moment's (GMM) estimator that allows the regressors to be transformed to achieve orthogonality between them and error terms[19]. While the GMM estimator can account for firm heterogeneity, it does not account for the endogeneity of regressors. The dynamic growth effects may introduce autoregression in error structure. Arellano and Bond (1991) have proposed a dynamic panel estimator that optimally exploits the linear moment restrictions implied by the dynamic panel model we use here. This method uses all past values of endogenous regressors as well as lagged values of all strictly exogenous regressors as instruments[20]. Thus we use this method to estimate equation (7.5).

Notice that the error term in our model, equation (7.5), has three components: unobserved firm specific effects α_i, time-specific effects α_t, and the standard innovation error term $\varepsilon_{i,t}$. In order to get consistent estimators Arellano and Bond (1991) propose to first-difference

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[19] For full theoretical and empirical details about Generalised Method of Moments (GMM) estimation see Matyas (1999).

[20] When the explanatory variables are predetermined but not strictly exogenous, only lagged values of these variables are valid instruments. If these variables are strictly exogenous, the current and lagged values are valid instruments.

the regression equation to eliminate the unobserved firm fixed effects. Thus, the regression equation after taking the first difference of equation (8.5) can be written as:

$$\Delta y_{i,t} = \gamma_1 \Delta y_{i,t-1} + \gamma_2 \Delta GK_{i,t} + \gamma_3 \Delta GL_{i,t} + \gamma_4 \Delta SMF_{i,t} + \gamma_5 \Delta AGE_i + \gamma_6 \Delta COM_{i,t} + \gamma_7 \Delta CR_{i,t} + \Delta \varepsilon_{i,t} \quad (7.6)$$

GMM methods are used to estimate the parameters in equation (7.6). Given that the $\varepsilon_{i,t}$'s are serially uncorrelated, the GMM is the most efficient one within the class of instrumental variable estimators (Honore and Hu, 2000). In estimating (7.6), $y_{i,t-2}$ or higher lagged values (wherever feasible) are valid instrumental variables. Thus typically the coefficient estimates of the parameter vector $\theta = (\gamma_1,...\gamma_7)$ are given by:

$$\hat{\theta}_{GMM} = (X' \; w a_n \; w' \; X)^{-1} (X' \; w a_n \; w' \; \Delta y) \quad (7.7)$$

where X is the vector of the first differenced explanatory variables, w is the matrix of instrumental variables, a_n is the weighting matrix, and Δy is the (NT X 1) vector of the first differences of firm's growth rates. Under the assumptions that there is no serial correlation in the error term ε and that the explanatory variables are weakly exogenous, in the sense that they are assumed to be uncorrelated with future realisations of error the term, the following moment conditions apply to the lagged dependent variable and set of explanatory variables:

$$E\left[y_{i,t-s} \left(\varepsilon_{i,t} - \varepsilon_{i,t-1} \right) \right] = 0 \qquad \text{for } s \geq 2; t = 3,...,T \quad (7.8)$$

$$E\left[X_{i,t-s} \left(\varepsilon_{i,t} - \varepsilon_{i,t-1} \right) \right] = 0 \qquad \text{for } s \geq 2; t = 3,...,T \quad (7.9)$$

Using these moment conditions, Arellano and Bond (1991) propose a two-step GMM estimator using an estimated variance-covariance matrix formed from the residuals of a preliminary consistent estimate of θ_t. In other words, in the one-step they assumed that the error terms are independent and homoscedastic across firms and over time. In the two-step, they used the residuals obtained from the one-step to construct a consistent estimate of the variance-covariance matrix, thus relaxing the assumption of independence and homoscedasticity. Thus, two different choices for a_n result in two GMM estimators. The one-step estimator can be found by using:

$$a_n = \left(\frac{1}{N} \sum_i^N w_i' \; hw_i \right)^{-1} \tag{7.10}$$

where h is a T-2 square matrix with twos in the main diagonals, minus ones in the first subdiagonals, and zero otherwise. This matrix is given by:

$$h_i = h_i^D = \begin{pmatrix} 2 & -1 & \cdots & 0 \\ -1 & 2 & \cdots & 0 \\ . & . & & . \\ . & . & & . \\ . & . & & -1 \\ 0 & 0 & -1 & 2 \end{pmatrix}$$

A two-step estimator is found by letting

$$a_n = \left(\frac{1}{N} \sum_i^N w_i' \, \Delta\hat{e}_i \, \Delta\hat{e}_i' \, hw_i \right)^{-1} \tag{7.11}$$

where $\Delta\hat{e}$ is the residuals from a consistent one-step estimator of Δy. We use the two-step estimator to estimate the coefficients of the firm's growth model and we will refer to this estimator as the difference estimator.

Blundell and Bond (1998b) however, show that when the lagged dependent and the explanatory variables are persistent over time, lagged levels of these variables are weak instruments for the regression equation in differences. The instruments' weaknesses have repercussions on both the asymptotic variance and the small-sample performance of the difference estimator. As the variables' persistence increases, the asymptotic variance of the coefficients obtained with the difference estimator rises. Furthermore, according to Blundell *et al.,* (2000) simulation studies suggest that the difference estimator has a large finite-sample bias and poor precision, especially with samples which have a small time series dimension.

To confront these econometric problems, we also use the GMM system estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998b). This estimator combined the regression in differences with the regression in levels. The instruments for the regression in differences are the same as above *i.e.*, the lagged levels of the corresponding variable, so that, the moment conditions in equations (7.8) and (7.9) apply to the first part of the system. The instruments for the regression in levels are the lagged differences of the corresponding variables. The latter are valid instruments under the following additional assumption: although there might be a correlation between the level of the right-hand side variables and the firm-specific effects in equation (7.5), there is no correlation between the differences of these variables and the firm-specific effects:

$$E\left[y_{i,t+p}\cdot\alpha_i\right]=E\left[y_{i,t+q}\cdot\alpha_i\right] \quad and \quad E\left[X_{i,t+p}\cdot\alpha_i\right]=E\left[X_{i,t+q}\cdot\alpha_i\right] \quad for \quad all \quad p \quad and \quad q \qquad (7.12)$$

Therefore, the following forms give the additional moment conditions for the second part of the system (the regression in levels)[21]:

$$E\left[\left(y_{i,t-s}-y_{i,t-s-1}\right)\quad\left(\alpha_i+\varepsilon_{i,t}\right)\right]=\ 0 \qquad for \quad s=1 \qquad (7.13)$$

$$E\left[\left(X_{i,t-s}-X_{i,t-s-1}\right)\quad\left(\alpha_i+\varepsilon_{i,t}\right)\right]=\ 0 \qquad for \quad s=1 \qquad (7.14)$$

For this estimator (system of equations), in first differences and levels, the one-step uses the following weighting matrix:

$$h_i=\begin{pmatrix} h_i^D & 0 \\ 0 & I_i \end{pmatrix}$$

where h_i^D is the weighting matrix described above for the first differenced estimator, and I_t is an identity matrix with a dimension equal to the number of level equations observed for individual i. In both cases the corresponding two-step estimator uses equation (7.11).

Thus, we will use the GMM system estimator to generate consistent and efficient estimators of the parameters of interest. However, the consistency of the GMM estimator

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[21] Given that the lagged levels are used as instruments in the difference specification, only the most recent difference is used as an instrument in the level specification. Using other lagged differences would result in

depends on the assumption that the lagged value of the firm's value added growth and the other explanatory variables are valid instruments in the growth regression and that the error terms do not exhibit serial correlation. To address these issues we perform three tests proposed by Arellano and Bond (1991); Arellano and Bover (1995); and Blundell and Bond (1998b). The first test examines the hypothesis that the error term is not serially correlated. In both the difference regression and the system difference-level regression we test whether the differenced error term is second-order serially correlated[22]. Under the null hypothesis of no second-order serial correlation, this test is distributed standard-normal. The second one is the Sargan test of over-identifying restrictions[23]. This tests the overall validity of the instruments and for the GMM estimator in the first-differenced model this test statistic takes the following form:

$$S_d = \frac{1}{N} \Delta \hat{e}_i' \, w_i \, a_n \, w_i' \, \Delta \hat{e}_i \qquad (7.15)$$

where a_n is the optimal weight matrix as in (7.11) and $\Delta \hat{e}_i$ are the two-step residuals in differenced model. Under the null-hypothesis of validity of the instruments this test is distributed χ^2 with degrees of freedom calculated as the difference between the number of instruments and the number of regressors. For the system estimator, the same test is readily defined.

The third test is the difference Sargan statistic, which tests the additional set of restrictions of the system estimator. This test is obtained as the difference between the first-difference and the system Sargan statistics. This statistic test is asymptotically distributed as χ^2 under the null-hypothesis of validity of the additional instruments. The degree of freedom of the difference Sargan test is given by the number of additional restrictions in the system estimator, which is given by the difference between the number of degrees of freedom of the system estimator and that of the difference estimator[24]. Failure to reject the null hypothesis of both tests gives support to our model specification.

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redundant moment conditions (Arellano and Bover, 1995). Increasing the number of moment conditions can lead to the instruments being weak, having low correlation with the variable they are instrumenting.

[22] By construction, if the error terms are not serially correlated, it is likely to be evidence of serial correlation in differences residuals, and no evidence of second order serial correlation in the differenced residuals (see Arellano and Bond, 1998).

[23] See Sargan (1958) and the development for GMM in Hasen (1982).

[24] Full details of these test procedures can be found in Arellano and Bond (1991) and Arellano and Bover (1995).

7.6 Data

This section provides the data sources, sample selection, variables measurement and summary statistical analysis.

7.6.1 Data Sources and Sample Selection

All our industrial firms' data set of publicly traded companies of the years 1988 to 1998 are obtained from the "*Guide of the Publicly Held Corporations*" published annually by the AFM since its establishment in 1978. Companies listed at the AFM are required to submit certain data and a copy of their annual reports to AFM. Data related to these companies are compiled from these reports, the AFM, and other resources, and then published in the "*Guide*" to present a close approximation of companies' annual overall operations. The purpose of the "*Guide*" is to provide information about these companies for those who are concerned, especially for investors at the AFM.

In 1998, the "*Guide*" includes information about 175 companies listed in the AFM; out of them 90 are industrial companies. Industrial companies included in our sample must have information about the variables under investigation for the base year, and year +1. The base year is the year from which the variables under investigation are measured. Among the 90 industrial companies, we find that 56 companies satisfy this criterion every year during the period 1988 to 1998. Therefore, our sample company data set includes 56 industrial companies over an 11-year period of time in a balanced panel with no missing values for the variables under investigation. It may be useful to note here that the industrial companies included in our sample are highly diversified and operating in a number of unrelated fields.

To highlight the economic significance of the sample companies included, they accounted for about 14 percent of total investment in the Jordanian private sector as a whole and about 40 percent of total investment in the industrial sector for the period 1988-98. As a percentage of the gross domestic product, the total value added of these companies accounted for about 8.0 percent during the same period. As a percentage of industrial value added, which represents about 25 percent of the GDP, the total value added for our sample accounted for about 32 percent during the same period. Finally, the total market capitalisation of these companies accounted, on average, for about 23.4 percent of GDP;

about 31 percent of total market capitalisation and about 76 percent of market capitalisation of the industrial sector during the period 1988-98.

7.6.2 Measurement and Data Summary Statistical Analysis

The firm-specific variables are measured as follows. The firm's real growth rate is measured as the ratio of value added in year +1 adjusted for inflation (using the CPI) to the value added in year 0, minus one[25]. Similarly, the growth rate of capital expenditures is defined as the ratio of capital expenditures in year +1 adjusted for inflation to the capital expenditures in year 0, minus one. The growth rate of employment is measured as the ratio of the number of employees in year +1 to the number of employees in year 0, minus one. The ownership concentration ratio is measured by the percentage of shares controlled by large shareholders who own 10 percent or more of the firm. Firm age is defined as the last year for which we have data minus the year of establishment.

Following Nickell (1997), we use ex-post rents normalised on value added as an inverse measure of competition. The theoretical assumption under this measurement is that monopoly rents generated by firms decrease with more competition in the market (competition is associated with lower levels of rents generated). Rents are defined as follows: profit before tax + depreciation + interest payments – (cost of capital × capital stock). The cost of capital is equal to $rr + \delta + \lambda\rho$, where rr is the real interest rate (nominal interest rate on business loans minus the inflation rate), δ is the rate of depreciation assumed to be constant at 4 percent[26], ρ is the risk premium equal to the firm's market return less the short term interest rate (interest rate on three months JD certificates of deposits), λ is a weight equal to equity/(equity + debt).

Next, we have to define what we mean by equity and debt finance. A firm's dependence on equity finance is defined as the ratio of changes in the firm's paid-up capital emanating from changes in the number of shares outstanding as well as the price of shares to the capital expenditures. Alternatively, the dependence on equity finance can be defined as the share of investment that cannot be financed through internal finance (cash flows) and debt finance (capital expenditure minus cash flow from operations and debt divided by capital

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[25] This is a standard method to measure growth rates.

[26] 4 percent depreciation used here because all Jordanian quoted companies follow the International accounting standards Committee (IASC) norms which is not more than 4 percent depreciations.

expenditure)[27]. The operating cash flow is defined as the earnings after tax, less dividend, plus depreciation. The debt finance is defined as the change in the firm's total liabilities[28]. The firm capital expenditure is defined as the change in total assets. Similarly, the dependence on debt finance is defined as the ratio of debt issues (short and long-term) to capital expenditures.

As we have mentioned before, the degree to which the stock markets and banks influence growth depends on how effectively they carries out their mobilising, risk-sharing, liquidity and governance functions. Thus, to test our hypothesis, we need appropriate measures for these functions. While the perfect measures certainly do not exist, recent literature has developed indicators that proxy relatively well for the banking sector and the stock market development. In this chapter we use four indicators to measure the stock market development and one indicator to measure the banking sector development. It is important to note that each of these indicators has shortcomings and none of them directly measures the provision of financial markets functions. We therefore use a variety of measures to provide a richer picture than if a single indicator was used. The development of the stock market is measured by the following indicators: The market capitalisation ratio equals the value of listed shares divided by GDP, the total value of shares traded ratio equals the total of shares traded on the market exchange divided by GDP, the turnover ratio equals the value of total shares traded divided by the value of shares listed and the stock market volatility measured as an annualised standard deviation that is based on weekly market returns[29]. The banking sector development is measured by the value of credits to the private sector divided by GDP[30]. We include all of the above indicators in our regressions in logs instead of levels to allow for the nonlinearity in the relationship between financial development and growth illustrated by Levine *et al.,* (2000) and Beck and Levine (2000).

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[27] Both measures give us the same results.

[28]It is well known that the firm can obtain capital to finance the investment by increasing its short-term liabilities, such as the amount it owes to its suppliers or to financial intermediates, or by increasing long-term liabilities, such as long-term debt. Therefore, the increases in the firm total liabilities represent the capital expenditures that are financed by debt (short- and long-term debt).

[29] In the last two empirical chapters (Chapter V and VI) we also use trading/volatility and turnover/volatility ratios, but we refrain from this chapter and thereafter chapter, since they give similar results as the value-traded and turnover ratios.

[30] We exclude other empirical measure of banking sector development *i.e.,* total banking sector assets to GDP, from the empirical analysis in this chapter as well as in following empirical chapter because it has been insignificant in macroeconomic analysis (see Chapter V).

As we have mentioned earlier our explanatory variables we are interested in to test our issues are the interaction variables. Here we use mainly two types of interaction variables; namely, the stock market factor ($SMF_{i,t}$) and the debt market factor ($DMF_{i,t}$). The stock market factor for firm i at time t is measured by multiplying the dependence on equity finance for firm i at time t with the stock market development indicator at time t. Similarly, the debt market factor for firm i at time t is measured by multiplying the dependence on debt finance for firm i at time t with the banking sector development indicator at time t.

Table (7.1) provides summary descriptive statistics of all our variable measures in this chapter over the period 1988-98. As can be seen be from the table, there is a large variance in the measurement of the firm-level characteristic variables[31]. It is interesting to see that our sample firms rely heavily on new issues of shares on the stock market to finance their investment. As can be seen from the table, equity finance contributes about 46.5 percent to the firms' total capital expenditures during the period 1988-1998. With regard to debt finance, it accounts for about 28.5 percent of the firms' total capital expenditures during the same period. The remaining 25 percent of firms' capital expenditures were financed internally. This evidence is not surprising and also not new. It is consistent with the fact, as we have shown in Chapter III that the new issues on the stock market have been important in financing a considerable proportion of the private investment in Jordan. These new issues represented about 23 percent of total private investment in the country during the period 1988-98. More importantly, it is also consistent with the findings of Singh and Hamid (1992) and Singh (1995). Particularly, Singh and Hamid (1992) found that the 35 largest manufacturing companies listed on the Jordanian stock exchange during the period 1980-88 financed more than 50 percent of their growth from equity issues. Singh (1995) used the same Jordanian company sample but for a longer time period (1980-90). The Singh results confirm the earlier findings: he found that these Jordanian companies financed more than 40 percent of their growth from equity issues[32].

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[31] This is a normal phenomenon in panel firm studies.

[32] One of the reasons lying behind the reliance of the Jordanian firms on the stock market to finance their growth is the economic instability in Jordan which resulted in a shortage of long-term debt during the second half of 1980s and the early of 1990s. Therefore, the firms would have no choice but to relay more heavily on equity instruments, if they tap external markets for finance. Additionally, high stock market return and high domestic interest rates during this time would also cause the Jordanian firms to choose equity over debt, as both these factors reduce the cost of equity finance. Moreover, it appears that the banks in Jordan, due to the concentration of deposits in short-term maturities, are very reluctant to provide long-term credit in order to avoid a strong mismatch between the maturity structure of assets and liabilities. This may also have played an important role on why the Jordanian firms rely heavily on equity finance

Table 7.1: Summary Statistics

	Mean	Median	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
Y	4.72	3.47	45.7	2.311	8.291	48.62 (0.00)
GK	6.4	4.3	19.9	2.421	9.782	30.291 (0.00)
GL	3.08	2.74	28.13	3.85	12.13	36.69 (0.00)
AGE	24.73	21.00	11.46	0.806	3.021	32.62 (0.00)
COM	18.4	14.24	16.42	1.23	4.35	17.58 (0.00)
CR	31.7	26.2	24.5	0.71	2.75	23.25 (0.00)
ED	46.52	39.83	43.68	2.36	10.47	53.44 (0.00)
DD	28.54	21.53	56.49	3.55	13.84	55.35 (0.00)
MCR	65.97	65.80	12.82	0.49	2.03	0.882 (0.643)
VTR	18.64	15.73	8.94	0.924	2.787	2.24 (0.325)
TR	16.87	13.30	11.00	1.25	3.58	3.038 (0.218)
VOL	10.17	9.80	2.06	-0.06	2.44	0.149 (0.928)
BDR	59.59	59.79	13.03	0.29	1.724	0.904 (0.636)

y is the real growth rate of value added. GK is the growth rate of capital stocks. GL is the growth rate of employment. AGE, is the firm's age. COM is the inverse completion indicator. CR is the ownership concentration ratio. ED is the equity dependence (equity finance). DD is the debt dependence (debt finance). MCR is the stock market capitalisation ratio. VTR is the stock market value traded ratio. TR is the stock market turnover ratio. VOL is the stock market volatility. BDR is the ratio of credit to private sector to GDP.

Table (7.2) shows the correlation among the variables used in this chapter. The interaction of equity dependence and each of market capitalisation ratio, value-traded ratio and turnover ratio have a significantly positive correlation with the firm's growth at the five-percent level. The interaction of equity finance and market volatility is negatively correlated with the firm's growth (significant at the five-percent level). The interactions of debt dependence with the banking sector development indicator are positively and statistically significant (at the five-percent level) correlated with firm's growth. The inverse measure of the consumption, age and the growth rate of employees are negatively and significantly correlated with firm's growth. Not surprisingly, the growth rate of capital expenditure and the ownership concentration ratio are positively and significantly correlated with firms' growth.

Table 7.2: Correlation Among Variables

	y	GK	GL	AGE	COM	CR	SMF1	SMF2	SMF3	SMF4	DMF
y	1.00	0.329 (0.014)	-0.310 (0.00)	-0.287 (0.042)	-0.477 (0.012)	0.290 (0.036)	0.462 (0.015)	0.494 (0.042)	0.406 (0.020)	-0.312 (0.052)	0.56 (0.019)
GK		1.00	0.158 (0.003)	-0.200 (0.040)	-0.144 (0.040)	-0.039 (0.453)	0.321 (0.073)	0.382 (0.059)	0.392 (0.035)	-0.200 (0.022)	0.420 (0.023)
GL			1.00	-0.101 (0.084)	0.092 (0.724)	-0.034 (0.496)	-0.072 (0.72)	-0.081 (0.110)	-0.0710 (0.048)	0.001 (0.984)	-0.087 (0.063)
AGE				1.00	-0.029 (0.559)	0.172 (0.00)	0.079 (0.111)	0.116 (0.026)	0.113 (0.031)	-0.101 (0.025)	0.068 (0.332)
COM					1.00	-0.028 (0.577)	-0.024 (0.631)	-0.061 (0.254)	-0.055 (0.292)	-0.033 (0.536)	0.059 (0.401)
CR						1.00	-0.127 (0.010)	-0.151 (0.004)	-0.139 (0.008)	0.119 (0.023)	0.018 (0.798)
SMF1							1.00	0785 (0.00)	0.794 (0.00)	-0.243 (0.04)	-0.109 (0.121)
SMF2								1.00	0.791 (0.00)	-0.271 (0.020)	-0.121 (0.086)
SMF3									1.00	-0.231 (0.024)	-0.121 (0.085)
SMF4										1.00	-0.105 (0.135)
DMF											1.00

Notes: (P -Value in Parentheses). y is the real growth rate of value added. GK is the growth rate of capital stocks. GL is the growth rate of employment. AGE, is firm's age. COM is the inverse completion indicator. CR is the ownership concentration ratio. SMF1 to 4, are the interaction terms between equity dependence and stock market development indicators; market capitalisation, value-traded ratio, turnover ratio and volatility, respectively. DMF is the interaction term between debt dependence and banking sector development; the ratio of banks credit to private sector to GDP.

7.7 Empirical Results

In this section we begin our analysis of the relationship between financial development and the firms' growth. In particular, we investigate three related hypotheses. Firstly, on a cross-sectional basis, we expect that firms which are heavy users of equity finance should benefit more from more development in the stock market than firms that are not heavy users of equity finance. Thus, the explanatory variable whose influence we are interested in is the interaction between a firm's dependence on equity finance and the stock market development. Secondly, the stock market is complementary rather than a substitute for the banking sector in providing financial services to the corporate sector in Jordan. Thirdly, the market and the banking sector development have different effects on large and small firms. The changes in the stock market development are likely to have more significant influences on larger firms than on smaller ones, while the changes in the banking sector development are likely to have more influences on smaller firms than on larger firms.

The regressions we estimated here are dynamic in that they include the lagged dependent variable and regressors that may be likely to be endogenous/or correlated with the firm-specific effects. OLS levels estimation is therefore likely to be biased and in particular gives an upward bias in the estimate coefficient on the lagged dependent variable. Conversely, *Within Groups* estimation is likely to give a downward bias for the lagged dependent variable in a short panel (Bundell *et al.*, 2000). We therefore use the difference and system dynamic panel estimators described above. We use lagged values of the corresponding variables as instruments in the regression equation in differences and both the lagged levels and lagged differences of the explanatory variables in the system estimators. We work with two lags in order to avoid cases for which there might be first-order autocorrelation of the residuals. This technique assumes that past values of the explanatory variables are uncorrelated with the contemporaneous error term. At the same time, past explanatory variables are correlated with the contemporaneous value of explanatory variables.

The dynamic panel estimates suggest that financial sector development in Jordan influences on the firm's growth. Table (7.3) presents the results using the difference GMM dynamic-panel estimator. Table (7.4) gives the results from system GMM dynamic-panel estimation. We only present two-step GMM dynamic-panel estimators, since they are more

efficient than one-step estimates, and since only the Sargan test of over-identifying restrictions is heteroscedasticity-consistent only if based on the two-step estimates.

The tables present asymptotic "t" statistics calculated from heteroscedastic consistent standard errors associated with the GMM estimates, statistics for Sargan tests and test statistics for first and second order serial correlation. The model's goodness of fit statistics indicates that it fits the data very well, in all regressions. We reject the null hypothesis that the variations in the dependent variable cannot be explained by the explanatory variables as indicated by χ^2 statistic of the joint test of significance.

Before discussing the coefficient estimates, we discuss some specification tests since the validity of our results depend upon the consistency of the GMM-estimator we use. The key moment condition we exploit in our estimates is the lack of serial correlation among error terms. The test statistics presented in Tables (7.3) and (7.4) indicate that we cannot reject the null hypothesis of the absence of first or second order serial correlation[33]. The Sargan tests of overidentifying restrictions indicate that we cannot reject the null hypothesis that there is no correlation between the error terms and the instrument vector and that the models are correctly specified. Although the results of the system estimate are similar to those generated by difference estimates, the difference Sargan test for the validity of additional instruments does support the use of the GMM system estimator. These results imply that differences in the right-hand side variables are not correlated with the unobserved firm-specific effects, so that we can assume that the additional moment restrictions used in the system estimation hold.

We now discuss the coefficient estimates of GMM dynamic-panel estimation. We begin by discussing the explanatory variables that appear in all regressions. As can be seen from Tables (7.3) and (7.4), the coefficients of the regressions estimated by GMM difference estimator have relatively similar order of magnitude as the coefficients of the regressions estimated by GMM system estimator. The growth rate of capital expenditure has a large and significant positive correlation with the firm growth at the one-percent level or better. The growth rate of the number of employees has a small and significantly negative

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[33] In this test the null hypothesis is that the errors in the differenced equation exhibit no k-order serial correlation.

correlation with growth. This result may be explained by the effect of diminishing returns of labour productivity (adding more labour to production could increase the level of value added but not its rate of growth) that arises mainly from low capital-labour ratios, inadequate skills and short work-experience of young labour force. The results also suggest that older firms' have slower growth[34]. This supports the argument that older firms may have become petrified in some sense or may not have as strong an incentive as a younger firm to invest in new technology. Moreover, due to vintage effects, a younger firm may become productive if its capital stock is more modern than the capital stock of an older firm. As we expected, productive market competition and shareholder control have plausible effects on the firm's growth. More specifically, rents normalised on value added (an inverse measure of competition) are negatively related to the firms' growth, ownership concentration is positively related to future growth. The lagged dependent variable which captures the autoregressive nature of growth is positive and highly significant at the one-percent level or better.

We turn now to the main issue of the effect of the financial market development on a firm's performance in terms of value added growth. Column 1 of Tables (7.3) and (7.4) shows results for a firm's growth as a function of stock market factor (SMF) and also other explanatory variables that appear in all the regressions, where the stock market development indicator in this interaction term is the market capitalisation as a percentage of the GDP. As can be seen, in both, the difference and the system dynamic panel growth regressions, the coefficients estimated for the stock market factor (the interaction of stock market capitalisation ratio and equity dependence) is positive (0.073 in the difference panel dynamic regression and 0.052 in the system dynamic panel regression) and highly significant at the one-percent level or better. This result supports our hypothesis that firms that are heavily dependent on equity finance benefit more from the greater stock market development than firms that are not heavily dependents on equity finance. This result also indicates that, for a given firm with a positive equity dependence ratio, the higher level of the stock market capitalisation results in a higher growth rate of the firms. This result is inconsistent with Levine and Zervos (1996, 1998a) in which they fail to find a relationship between stock market capitalisation and growth in per capita GDP, Rajan and Zingales

[34] This result is consistent with Dune and Hughes (1994) and Heshmmati (2000) results that found negative relationships between the growth and age of firms in the U.S., UK and Sweden. However, Das (1995) found age and growth to be positively related using Indian hardware computer industry.

(1998) also fail to find market capitalisation as having effect on relative growth of financially dependent industries. However, this result is consistent with Demirguc-Kunt and Maksimovic (1998, 2000) findings at the firm-level data.

To illustrate the significance of this result, we consider the "*differential in real growth rate*" which indicates how much faster the firm at 75th percentile of equity dependence (for example, DAR AL-DAWA DEVELOPMENT&INVESTMENT) would have grown compared to the firm at the 25th percentile (for example, ARAB CENTER FOR PHARMACEUTICALS AND CHEMICALS)[35]. The coefficient estimates from the difference dynamic panel regression predicts that the DAR AL-DAWA DEVELOPMENT&INVESTMENT would grow 2.8 percentage points faster than the ARAB CENTER FOR PHARMACEUTICALS AND CHEMICALS[36]. This result therefore indicates that more development in the stock market ameliorates the market frictions and thereby promotes the growth of firms that rely more heavily on equity finance. This result also provides firm-level support and confirmation of the proposition that the development of the stock market facilitates the economic growth in Jordan.

Column 2 of Tables (7.3) and (7.4) show the results for the firm's growth as a function of the stock market factor (the interaction of the market capitalisation ratio and equity dependence) and the debt market factor (the interaction of the banking sector development and debt dependence), where the banking sector development indicator in the interaction term is the ratio of credit to the private sector to GDP. The reason behind including the debt market factor in the regression is to control the effect of debt finance and more importantly to shed any light on the argument that the banking sector is either complementary or a substitute to the stock market in providing financial services to corporate finance and whether the banking sector or the stock market are better at fostering firm growth in Jordan.

The results from the regression show that the debt market factor (DMF) in both the difference and the system dynamic panel growth regressions are positive and highly

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[35]Both firms are working in the same industry (Drugs industry).

[36] The growth differential is calculated as follows: 0.073 (the coefficient of the interaction term of the stock market development indicator and equity dependence) * 0.83 (equity dependence of the DAR AL-DAWA DEVELOPMENT&INVESTMENT minus equity dependence of the ARAB CENTER FOR PHARMACEUTICALS AND CHEMICALS) * 0.66 (the stock market development indicator; market capitalisation ratio).

significant at the one-percent level or better. This implies that firms heavily dependent on debt finance benefit more from the increased banking sector development than firms that are not heavy uses of debt finance. The results also imply that, for a given firm with a positive debt dependence ratio, the higher level of the banking sector development results in a higher growth rate of this firm. More importantly, as can be seen from the tables, the coefficient estimates for the stock market factor are still highly significant and stable after including the debt market factor (0.0742 in the difference panel dynamic regression and 0.044 in the system dynamic panel regression). This implies that the existence of a developed stock market as well as a developed banking sector is important in determining firms' growth in Jordan. In other words, the results indicate that firms that are heavy users of external finance grow faster with the higher overall levels of financial development. This result is consistent with the findings of Beck and Levine (2000) that industries that are heavily dependent on external finance grow faster in economies with a higher level of overall financial development.

More importantly, this result also suggests that the stock market and the banking sector in Jordan play different, yet complementary, roles. They provide different bundles of services to the nonfinancial sector. If they are a substitute and provide the same financial services then they would not both enter the growth regressions significantly. Possible explanations of this result can be found in the theoretical literature; banks primarily ameliorate information asymmetries, while stock markets primarily enhance liquidity and facilitate risk diversification. Thus, policies undertaken to develop the stock market need not adversely affect the existing banking system. Our results are also consistent with the findings in Chapter V of this study and the conclusion of Demirguc-Kunt and Levine (1996b), Demirguc-Kunt and Maksimovic (1996) and Demirguc-Kunt and Maksimovic (2000) that stock market and financial intermediary development proceed simultaneously[37].

Furthermore, when we look to the estimated coefficients of the stock market factor and the debt market factor, we find that the estimated coefficients of the interaction of equity dependence and all of each stock market development indicator used in this chapter are

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[37] This is also consisting with Boyd and Smith (1998) view, which argues that equity markets are complement to debt markets "*by issuing some equity, firms can make it cheaper to issue debt. This facts it possible for individual firms, and society, to economically employ high return capital productive technologies whose might other wise not be feasible*" (p.523-24).

greater than the estimated coefficients of the interaction of debt dependence and the measure of the banking sector development in the both types of estimators. This implies that firms that are equity dependent with a greater development of the stock market thrive better than firms that are debt dependent with a greater development of the banking sector. One possible explanation of this result can be found in the theoretical literature. As Levine (1991) argues, capital raised through equity issues is long-term, while the investor at short notice can liquidate shares without impacting the firm's projects. By contrast, if the firm finances with non-tradable, finite maturity debt held by banks, shocks to the banks may be transmitted on the firm and force liquidation of long-term projects. To the extent that stock markets create a separation between the liquidity shocks of investors and the investment needs of firms, the latter can take a longer-term view and invest more efficiently.

Another possible explanation for the above results is that the development of the stock market affects the cost of capital and capital efficiency of all firms, not just the financially dependent ones, while the development of the banking sector affects firms dependent on debt finance only. For example, better risk sharing, more liquidity and control attained through the equity market improve economic efficiency and reduce the cost of capital for all firms, not just the financially dependent ones. Furthermore, the Jordanian Banks are not involved heavily with nonfinancial firms, they hold little shares and are more like Anglo-Saxon banks[38]. Thus, the role of the banking sector in Jordan, in the sense of an Anglo-Saxon-Style for corporate control, is limited. They predominantly monitor from a creditor's perspective. Another feature of the Jordanian banking sector is the higher concentration ratio, where the share of the three main banks in total assets is almost 91 percent. A highly concentrated banking sector might reduce the ability to channel funds efficiently to firms (Beck, *et al.,* 1999a). Deidda and Crenos (2000) argue that increase banks competition increase the efficiency of banks operating in the credit market and therefore higher growth[39].

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[38] Under the Jordanian banking law, banks are forbidden to control nonbanking corporations and their holdings in these enterprises are limited to no more than 10 percent of the enterprise's capital. In addition, a banking corporation's total interest in nonbanking corporations cannot exceed 75 percent of the bank's capital.

[39] Peterson and Rajan (1995), however, present evidence that small businesses in the U.S. are less credit-constrained in more concentrated banking markets. Cetorelli and Gamberra (2000) find that financially more dependent industries grow faster in economies with more concentrated banks sectors. Stulz (2000) points out that, " *lack of competition among financial intermediaries increases the ability of a financial intermediary to extract rents from successful projects, thereby justifying the expenditure of resources on projects to increase their probability of success*" (p.19).

We will now turn to the question of whether the stock market and the banking sector development enhances small and large firms differently. In other worlds, whether the changes in the stock market development have a more significant influence on large firms than on smaller ones and whether the changes in the banking sector development have more influence on small firms than on larger firms. In order to test this hypothesis, in addition to the variables that we included in the regressions in column 2, we include another two variables; The first one is the interaction of the stock market factor (SMF) and dummy variable (DUM) which equals to one if a firm is large and zero other wise. A large firm is defined as having total assets greater than the sample median[40]. The second one is the interaction of the debt market factor (DMF) and the firm size dummy variable mentioned above.

The results are reported in column 4 of Tables (7.3) and (7.4). In both the difference and the system dynamic panel regressions, the results indicate a significantly positive interaction of the stock market factor and firm size dummy variable (SMF× DUM) on firm growth. At the same time, the coefficients of the stock market factor in the regressions falls but are still significant at the five-percent level. This result supports the argument that large firms display more sensitivity to the change in the stock market development than the small firms. In the same regressions the coefficients on the interaction terms of the debt market factor and the firm size dummy variable (DMF× DUM) are negative but insignificant at the five-percent level in the system dynamic panel estimator. In these regressions, the coefficients of the debt market factor (DMF) rise and are still significant in both types of estimators. In general, this result confirms the view that small firms are more sensitive than large firms to the change in the banking sector development.

When we use alternative measures of the stock market development and re-estimate the regression in column 2, we still find a strong, causal relationship between the interaction of equity dependence and the stock market development and the firm's growth. The last three columns of Tables (7.3) and (7.4) present these results where the stock market development indicators in the interaction terms are the value-traded ratio, turnover ratio and volatility, respectively. As can be seen in columns 4 and 5, the coefficients on interaction terms of equity dependence and the liquidity indicators, the value-traded ratio

[40] Within definition we have 22 large firms and 36 small firms.

and turnover ratio, are significantly positive at the one-percent level in both the difference and the system dynamic panel growth regressions. These results indicate that with more liquidity in the stock market, firms that use equity finance heavily grow faster than firms that do not use equity finance heavily. These results are consistent with the previous empirical studies in this field as well as our findings in the last two empirical chapters.

These results confirm also the view that increased market liquidity will increase the effectiveness of the governance's function of market and facilitate (risky) technological advances, thereby improving total factor productivity of firm[41]. Increased market liquidity can improve the effectiveness of the governance function in two ways. First, increased market liquidity induces information acquisition, which in turn increases the information content of share prices. The more liquid the market, the easier it becomes for an investor, who has obtained information about a firm, to trade at posted prices. Thus, investors can profit before the information becomes widely available and the price changes (Kyle, 1984). If investors can profit from obtaining information they will be more likely to research and monitor firms. More liquidity in markets increases the incentive to research firms, thus the improved information will help firms to overcome problems of moral hazard. Second, the effective use of the takeover mechanism requires a liquid market where bidders access a vast amount of capital on short notice.

The last column of the Tables 7.3 and 7.4 present the result where the stock market development in the interaction term is the market volatility. The result indicates that the coefficient on interaction term enters negatively (-0.056) and is significant at the one-percent level in the difference dynamic panel growth regression. In the system dynamic panel growth regression the coefficient enters negative (-0.060) but is insignificant at the five-percent level. Thus, in general, we can conclude that increases in the stock market volatility slow down the growth rates of the firms that depend heavily on equity financing. As is well known, more volatility in stock prices increases the cost of equity capital to firms and also increases the value of the "*option wait*", hence delaying productive investment[42]. Thus, the higher level of share prices volatility will impede the firms' growth, especially for those that are heavily dependent on equity finance.

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[41] In Chapter IV we have discussed in detail how more liquidity in stock markets can facilitate technological advances.

[42] In addition, higher share price volatility may deteriorate the role of share prices that aggregate information signals about firms as guide manager's investment decisions. A greater volatility in stock prices also would

Table 7.3: Financial Market development and Firms Growth: Difference Dynamic Panel Regressions.

Independent Variables	Dependent Variable $y_{i,t}$					
	1	2	3	4	5	6
$y_{i,t-1}$	0.385 (75.80) [0.000]	0.382 (74.70) [0.00]	0.368 (57.00) [0.00]	0.381 (112.00) [0.000]	0.382 (96.30) [0.000]	0.383 (79.40) [0.000]
$GK_{i,t}$	0.406 (4.98) [0.000]	0.386 (4.73) [0.000]	0.401 (7.51) [0.000]	0.356 (4.95) [0.000]	0.407 (4.61) [0.000]	0.377 (4.48) [0.000]
$GL_{i,t}$	-0.0008 (-11.0) [0.000]	-0.0013 (-6.81) [0.000]	-0.00034 (-11.9) [0.000]	-0.0005 (-12.8) [0.000]	-0.0006 (-6.43) [0.000]	-0.0004 (-2.53) [0.013]
$SMF_{i,t}$	0.073 (6.25) [0.00]	0.0742 (12.1) [0.00]	0.0072 (2.43) [0.027]	0.117 (2.32) [0.032]	0.157 (2.52) [0.013]	-0.056 (-3.49) [0.001]
$AGE_{i,t}$	-0.282 (-1.84) [0.068]	-0.378 (-1.74) [0.143]	-0.171 (-1.48) [0.242]	-0.569 (-7.04) [0.00]	-0.564 (-5.80) [0.00]	-0.523 (-6.09) [0.00]
$COM_{i,t}$	-0.413 (-6.66) [0.000]	-0.326 (-5.42) [0.000]	-0.375 (-7.94) [0.000]	-0.189 (-3.84) [0.000]	-0.516 (-7.07) [0.000]	-0.523 (-8.49) [0.000]
$CR_{i,t}$	0.176 (4.26) [0.000]	0.141 (3.09) [0.002]	0.103 (1.61) [0.108]	0.114 (4.13) [0.000]	0.116 (2.11) [0.037]	0.093 (2.04) [0.039]
$DMF_{i,t}$		0.0167 (5.85) [0.000]	0.086 (5.29) [0.000]	0.0136 (4.93) [0.000]	0.0182 (6.351) [0.000]	0.0126 (4.13) [0.000]
$SMF_{i,t}*DUM_{i,t}$			0.185 (8.29) [0.000]			
$DMF_{i,t}*DUM_{i,t}$			-0.055 (-12.20) [0.000]			
1st Order Serial Correlation LM (1)	[0.650]	[0.494]	[0.599]	[0.596]	[0.631]	[0.619]
2nd Order serial Correlation LM (2)	[0.239]	[0.198]	[0.128]	[0.281]	[0.268]	[0.286]
Joint Test of Significance	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Sargan Test	[0.764]	[0.794]	[0.791]	[0.791]	[0.915]	[0.918]

Numbers in Parentheses are t-values and numbers in Brackets are p-values. This table reports the GMM-DIFFERENCE regression, estimated by using DPD99 package for Ox. Time dummies are included in all the regressions. The dependent variable in all models is the growth rates of value added. $GK_{i,t}$ and $Gl_{i,t}$ are growth of capital stock and the number of employees , respectively. $SMF_{i,t}$ is the interaction between the firm dependence on equity and the stock market development. In the regressions from 1 to 3, the stock market development is the market capitalisation ratio. In regression 4, 5, and 6, the stock market development are total value-traded ratio, turnover ratio and volatility, respectively. $AGE_{i,t}$ is defined as the firm's age. $COM_{i,t}$ is the inverse competition indicator, defined as the ratio of ex-post rent to net sales. $CR_{i,t}$ is the ownership concentration ratio. $DMF_{i,t}$ is the interaction between the firm's dependence on debt finance and bank sector development. The bank sector development is the private credit to GDP. $DUM_{i,t}$ is the firm's size dummy variable equal 1 if the firm is large. LM (k) is the test statistic for the presence of k-th order serial correlation in the first–differenced residual, the null hypothesis is that the errors in the first-difference regression exhibit no k-order serial correlation. Sargan is a Sargan test of the overidentifying restrictions; the null hypothesis is that the instruments used are not correlated with the residuals. The joint test statistic is a test of the joint significance of all independent variables.

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make investors more averse to holding stocks and demand a higher risk premium, which implies a higher cost of capital and less investment.

Table 7.4: Financial Market Development and Firms Growth: Dynamic Panel Regressions, System Estimator

Independent Variables	Dependent Variable $y_{i,t}$					
	1	2	3	4	5	6
$y_{i,t-1}$	0.220 (41.70) [0.000]	0.225 (41.77) [0.000]	0.169 (21.20) [0.000]	0.198 (17.1) [0.000]	0.221 (24.30) [0.000]	0.227 (40.50) [0.000]
$GK_{i,t}$	0.330 (1.98) [0.049]	0.397 (3.27) [0.00]	0.195 (2.70) [0.022]	0.362 (1.83) [0.069]	0.407 (2.09) [0.038]	0.386 (1.89) [0.061]
$GL_{i,t}$	-0.0003 (-3.18) [0.002]	-0.0017 (-12.1) [0.000]	-0.0020 (-7.42) [0.000]	-0.0005 (-10.10) [0.000]	-0.0012 (-3.06) [0.03]	-0.0009 (-3.14) [0.002]
$SMF_{i,t}$	0.052 (4.32) [0.000]	0.044 (2.23) [0.027]	0.0147 (1.82) [0.035]	0.060 (3.29) [0.00]	0.117 (1.610) [0.011]	-0.060 (-1.07) [0.288]
$AGE_{i,t}$	-0.418 (-7.4) [0.000]	-0.530 (-4.04) [0.000]	-0.386 (-8.40) [0.000]	-0.481 (-12.8) [0.00]	-0.375 (-8.46) [0.000]	-0.296 (-6.86) [0.000]
$COM_{i,t}$	-0.404 (-6.61) [0.000]	-0.232 (-4.42) [0.000]	-0.348 (-4.45) [0.000]	-0.371 (-3.99) [0.000]	-0.523 (-4.86) [0.000]	-0.443 (-7.48) [0.000]
$CR_{i,t}$	0.187 (5.12) [0.000]	0.105 (3.74) [0.000]	0.103 (5.20) [0.000]	0.269 (6.67} [0.000]	0.217 (5.23) [0.000]	0.153 (7.36) [0.000]
$DMF_{i,t}$		0.032 (8.71) [0.000]	0.041 (7.90) [0.000]	0.022 (7.43) [0.000]	0.029 (8.62) [0.000]	0.024 (7.83) [0.000]
$SMF_{i,t}*DUM_{i,t}$			0.332 (7.01) [0.000]			
$DMF_{i,t}*DUM_{i,t}$			-0.278 (-0.653) [0.515]			
1st Order Serial Correlation LM (1)	[0.847]	[0.997]	[0.499]	[0.711]	[0.788]	[0.785]
2nd Order serial Correlation LM (2)	[0.271]	[0.243]	[0.729]	[0.385]	[0.292]	[0.288]
Joint Test of Significance	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Sargan Test	[0.999]	[0.997]	[0.999]	[0.995]	[0.998]	[0.999]

Numbers in Parentheses are t-values and numbers in Brackets are p-values. This table reports the GMM-SYSTEM regression, estimated by using DPD99 package for Ox. Time dummies are included in all the regressions. The dependent variable in all models is the growth rates of value added. $GK_{i,t}$ and $Gl_{i,t}$ are growth of capital stock and the number of employees , respectively. $SMF_{i,t}$ is the interaction between the firm dependence on equity and the stock market development. In the regressions from 1 to 3, the stock market development is the market capitalisation ratio. In regression 4, 5, and 6, the stock market development are total value-traded ratio, turnover ratio and volatility, respectively. $AGE_{i,t}$ is defined as the firm's age. $COM_{i,t}$ is the inverse competition indicator, defined as the ratio of ex-post rent to net sales. $CR_{i,t}$ is the ownership concentration ratio. $DMF_{i,t}$ is the interaction between the firm's dependence on debt finance and bank sector development. The bank sector development is the private credit to GDP. $DUM_{i,t}$ is the firm's size dummy variable equal 1 if the firm is large. LM (k) is the test statistic for the presence of k-th order serial correlation in the first–differenced residual, the null hypothesis is that the errors in the first-difference regression exhibit no k-order serial correlation. Sargan is a Sargan test of the overidentifying restrictions; the null hypothesis is that the instruments used are not correlated with the residuals. The joint test statistic is a test of the joint significance of all independent variables.

7.8 Summary and Conclusion

In this chapter we provide a test on micro-level data of the hypothesis that the development of the stock market is an important determinant of the economic growth in Jordan. In particular, we investigate three related issues. Firstly, whether the firms that heavily depend on equity finance grow faster with the higher level of the stock market development than firms that are not heavily dependent on equity finance. Secondly, whether the stock market is a substitute or a complement for the banking sector in providing financial services to the corporate sector in Jordan and whether the stock market or the banking sector is better in providing financial services and therefore enhancing growth in these firms. Thirdly, whether the performance of large and small firms in terms of growth react differently to the stock market and banking sector development.

In order to examine the above issues, we extend a simple empirical model that incorporates the financial market development effects and other variables that may affect the firm's growth. We begin from a premise that financial markets provide mainly two critical functions to an economy: allocation of risk capital through saving mobilising and risk-pooling and sharing; and promotion of responsible governance and control through providing outside investors a variety of mechanisms for monitoring inside decision makers. We argued that these functions of financial markets influence firm performance by promoting technological innovations and inducing the efficiency with which resources are utilised.

We use firm-level panel data for a sample of 56 Jordanian industrial quoted companies covering the period 1988-1998. With this panel data set we use a difference dynamic panel estimator developed by Arellano and Bond (1991) and a system dynamic panel estimator developed and studied by Arellano and Bover (1995) and Blundell and Bond (1998a, 1998b) which mitigates some of the biases frequently found when using the difference dynamic panel estimator.

Both types of estimators tell the same story: the level of activity and the size of the stock market exerts a statistically significant and economically large impact on the firms' growth. More particularly, we find results indicate that with more development in the stock market firms that use equity finance heavily grow faster than firms that do not. These

findings provide firm-level support for the proposition that the development of the stock market facilitates economic growth in Jordan, advanced by the last two empirical chapters.

Our results also show that both the stock market and the banking sector development are important in facilitating the firm's growth in Jordan. In particular, we find that measures of both market and banking development independently predict firm's growth when entered together in firm growth regressions. Besides emphasising the strong link between the financial system and firm growth, this result confirms our findings in Chapter V that the stock market and the banking sector in Jordan are complementary rather than substitutes in providing financial services to the corporate sector. They provide different financial services to the corporate sector. So, government policies to develop the stock market need not distinguish the importance of the banking sector. Finally, we find results are consistent with the hypothesis that the stock market and the banking sector development have different effects on small and large firms. The evidence suggests that large firms are more sensitive to the stock market development, while small firms are more sensitive to variations in the banking sector development.

Chapter VIII

Microeconomic Evidence: Stock Market Development and the Financial Choices of Firms

8.1 Introduction

The different attributes of debt and equity make the development of markets that facilitate the issuance of and trading in these securities very important. The level of financial development will be reflected in the financing decisions of individual firms. Financial decisions affect firms' investment, profitability and productivity growth. Greenwald and Stiglitz (1990) among others emphasised in their theoretical model the effect of a firm's financial structure on its behaviour *i.e.* employment, production, pricing, investment and research. Bernstein and Nadiri (1993) point out that, "*financial structure affects output supply, input demand, and therefore allocative and dynamic efficiency*" (p.2). Moreover, Lang *et al.*, (1996) and Boyd and Smith (1998) argue that an increase in the level of growth is associated with a lower ratio of debt to equity. Singh and Hamid (1992) point out that, "*the availability of the appropriate kind of finance could constrain a firm's growth or investment plans*" (p. 6)[1]. Therefore, establishing evidence for the effect of the stock market on financial structure will add to and confirm the second side to relation between the stock market development and firms' growth which has been documented in the previous empirical chapter.

While there are many empirical studies that examine how specific imperfections affect a firm's optimal capital structure, there has been very little empirical evidence for the effect of stock market development on the capital structure choices made by firms, especially in

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[1] In addition, Nakamura and Nakamura (1982) point out that, "*some economists have ignored corporate financial decisions on the assumption they do not affect the investment and production decisions of firms. Yet even if this extreme position is accepted, firms must still make financing decisions which in turn have an impact on other sectors of the economy. Since interest payments on corporate debt are tax deductible, the reliance of firms on debt as opposed to equity financing directly affects both the revenue of federal government collects through taxation of corporate profits. The corporate presence in bond markets and corporate borrowing from banks can be expected to affect both interest rates and the demand for money*" (p.384).

developing countries. In fact, to date only one empirical study has been completed. Demirguc-Kunt and Maksimovic (1996) investigated this issue for developed and developing countries during the 1980s using cross-country regressions[2]. By addressing some of the shortcomings of this study, in this chapter we examine how the development of the stock market affects the ability of Jordanian firms to raise capital for new growth and how this development affects the capital structure choices these firms make.

In a fundamental sense, the value of a firm is the discounted stream of expected cash flows generated by its assets. Investors who hold various types of claim on a firm's cash flows finance the assets of that firm. Debt holders have a relatively safe claim on the stream of cash flows through the contractual guarantee of a fixed schedule payment. The mix of debt funds and equity funds (leverage) employed by a firm define its capital structure. Firms attempt to issue the particular combination of debt and equity, subject to various constraints and imperfections that maximises overall market value. The mix of funds affects the cost and availability of capital, and thus, firms' real decisions about investment, production and employment (Pagano, 1993b; Zwiebel, 1996; Boyd and Smith, 1998; Biais and Casamatta, 1999; Cooley and Quadrini, 2000; Shin and Stulz, 2000; and Yanagawa, 2000)[3].

Under certain restrictive assumptions, a firm's value is independent of its mix of debt and equity. This hypothesis is embodied in the original Modigliani and Miller (1958) value-invariance proposition. Modigliani and Miller (MM) assert that in an ideal world with perfect and complete capital markets and in the absence of taxes, the value of a firm depends only on its cash flows, not on the debt-equity mix. Therefore corporate valuations are independent of the existing capital structure. In addition, the cost of capital is

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[2] This study will be discussed in detail in Section 8.3.

[3] Masulis (1983) estimates the impact of a change in a firm's capital structure on its value and finds that both stock prices and firm values are positively related to changes in debt level and leverage. Opler and Titman (1994) find that sales growth is lower for firms in the three highest deciles of leverage, but especially so within distressed industries. Lang *et al.,* (1996) examine the relation between leverage and real capital expenditure, employment and net investment growths and find a strongly negative relation. Bernstein and Nadiri (1993) have provided evidence to suggest that financial decisions are greatly affect the profit and productivity growth of U.S firms. In addition, Fazzari *et al.,* (1988), Peyer and Shivdasani (2001), Hayash and Inoue (1991), Blundell *et al.,* (1992), Cho (1995) and Lensink and Sterken (1998) find evidence from the US, Japan, UK, Korea and the Czech Republic, indicating that investment spending is greatly affected by financial policies. Hanka (1998) finds that firms with higher debt have reduced their workforce more often, paid more part-time and seasonal employees, and paid lower wages. Finally, Sharpe (1994) finds that there is a strong relationship between a firm's financial leverage and the cyclicality of its labour force. He points out

independent of capital structure, so that the choice between debt and equity is irrelevant and does not affect a firm's value. But, if corporate income is taxed and interest payments are tax deductible, then leverage has a tax advantage and firms may emphasise debt financing.

Of course, these conclusions are at variance with what one sees in the real world, where capital structure matters and banks are extremely reluctant to finance a project with one hundred percent debt. MM spurred financial economists to come up with the conditions under which financial structure would indeed matter, such a search still continues today and is the foundation of modern corporate finance. Broadly speaking, four theoretical approaches can be distinguished, namely, models based on tax consideration, bankruptcy and financial distress costs, agency costs and symmetric information issues[4]. These theories identify many firm-specific factors that may affect a firm's optimal structure.

As we have shown in the previous chapters, stock markets are not only a source of capital for firms, but are also a marketplace for a firm's future prospects and may even provide incentives for investors to acquire information about a firm. We argue that the development of stock markets would improve risk sharing and information dissemination, which makes both equity and debt less risky, and expansion more attractive. Thus, the development of stock markets could allow firms to issue more debt and equity. In this circumstance, debt and equity finance are not necessarily substitutes for each other, but are possibly financial tools that play significantly different roles in the financing decision.

In view of the above arguments, this chapter empirically explores the effect of stock market development on corporate capital structure in Jordan. In doing so, it provides a second side investigation of how the stock market can affect a firm's growth. The particular question we attempt to address in this chapter is as follows: How does stock market development affect the ability of Jordanian firms to raise capital for new growth and how does this development affect the capital structure choices that these firms make? It should be noted that this study represents the first attempt to examine empirically the

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that, "*employment growth at more highly leveraged firms is more sensitive to demand and financial-market conditions over the business cycle*" (p.1060).

[4] The brief discussions of these theories are in the following section.

effect of stock market development on firms' financial structure within a specific country's experience.

Unlike most previous capital structure studies which study the determinants of capital structure using a non-dynamic model, we employ a dynamic adjustment model. This model allows us to shed light on the nature of dynamic capital structure adjustment by firms, *i.e.*, on whether firms do indeed move towards target leverage ratios or away from them, and the speed with which they do that. In addition, our empirical analysis, as in the previous empirical chapter, is carried out with the Generalised Method of Moments (GMM) for panel data utilising instrumental variables. Particularly, we use two GMM dynamic panel estimators: GMM-Difference and GMM-System estimators. These estimators specifically address the econometric problems produced by firm-specific effects and endogeneity. In fact, using this type of data may give rise to heteroscedaciticity. GMM enables consistent estimation in spite of heteroscedasticity and autocorrelation, which would blur the result if a method like OLS were used[5].

The sequence of the rest of the chapter is as follows: Section 8.2 provides a review of capital structure theories. Section 8.3 provides a review of some previous empirical literature. Section 8.4 outlines the empirical model and discusses the variables measure. Section 8.5 presents the empirical results. Section 8.6 presents a conclusion to this chapter.

8.2 Capital Structure Theories

Theories of capital structure have been well documented in the literature and we provide only a short review here[6]. In this section we identify the main strand of the theoretical literature and draw out general principles that have enjoyed the empirical support of econometric studies. We also provide a simple theoretical analysis of the effect of stock market development on a firm's financial choices. These general themes will provide a useful framework for our empirical analysis.

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[5] See Section 7.5.
[6] Full surveys of capital structure theories are contained in Harris and Raviv (1991).

8.2.1 Target Leverage Theories

Many papers have been written, on the effect of introducing taxation into the MM framework. Other papers have introduced the costs associated with bankruptcy and financial distress while others have added agency costs and asymmetric information. Below, we provide a short discussion of each of these theories.

I. Taxation theories

As mentioned above, MM postulated that in an ideal world with perfect and complete capital markets and in the absence of taxes, the value of a firm depends only on its cash flows, not on the debt-equity mix. Therefore corporate valuations are independent of existing capital structure. In addition, the cost of capital is independent of capital structure, so that the choice between debt and equity is irrelevant.

Clearly, in a world of imperfect and incomplete capital markets, this theory cannot explain the differences in corporate capital structure. Many discussions on capital structure choice deal with the effects of taxes, or more precisely with the effects of different taxation of debt and equity. Under these theories, interest paid on debt is deductible from income and reduces a firm's tax liabilities whereas dividends are not deductible; therefore, debt has a tax advantage over equity. By increasing the amount of debt and reducing equity, a firm may increase the rate of profit per dollar invested by shareholders. In other words, the more leveraged the firm, the more valuable its equity. This assumes that the returns on capital before tax are at least equal to the interest rate on debt (Myers, 1977). However, as with the MM postulate, this factor cannot fully explain the differences in capital structure across countries. In addition, in most empirical studies of determinants of optimal capital structure, tax variables are not significant in explaining leverage rates[7]. In the case of Jordan, it seems that tax consideration is not important determinants of the capital structure of the Jordanian firms. In Jordan, interest is tax deductible for corporate tax purpose. On the other hand, dividends as well as capital gains are tax-exempt. Therefore, there is no tax advantage of debt over equity in the Jordanian tax system.

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[7] See for example Bradley *et al.,* (1984); Mayer (1988), Titman and Wessels (1988) and Rajan and Zingals (1995) and others.

II. Bankruptcy Costs Theories

In the MM world there are no bankruptcy costs. In reality, bankruptcy imposes both direct and indirect costs on a firm. Direct costs include legal expenses and trustee fees. Indirect costs include disruption of operations, loss of suppliers and the imposition of financial constraints by creditors. These indirect costs of bankruptcy and the financial distress costs that may occur if the firm does not enter bankruptcy can be significant[8]. These costs carry a number of implications for capital structure choice. First, leverage ratios may inversely relate to the measure of financial risk or business risk measured by the variation in a firm's cash flows (Graham, *et al.,* 1998, Shin and Stulz, 2000). The bases of this argument are that the existence of debt in the capital structure increases the probability of bankruptcy, and a firm with more variable cash flows, that is, higher risk, has a higher probability of bankruptcy for a given level of debt. Most empirical works support this relation in that the optimal leverage ratio is inversely related to business risk (see for example, Castanias, 1983; Bradely *et al.,* 1984)[9]. Second, leverage ratios may be positively related to firm size. If bankruptcy costs include a fixed component, these costs as a fraction of the value of a firm will increase as the firm size decreases (Ang, *et al.,* 1982) large firms may also have lower risk through diversification, more stable cash flows and established operating and credit histories. These factors provide large firms with greater access to alternative sources of finance in times of financial distress. This may encourage them to take on relatively high debt burdens. Third, leverage may be positively related to the value of a firm's tangible assets or liquidation values (Scott, 1976; Myers, 1977; Alderson` and Betker, 1995; and Choate, 1997). Higher liquidation values reduce the expected losses accruing to debt holders in the event of financial distress, thus making debt less expensive (Williamson, 1988)[10]. Finally, the leverage ratio is positively related to the inverse of Tobin's Q ratio which measures the potential loss of growth opportunities in the case of bankruptcy (*i.e.,* it also proxies for bankruptcy costs). This implication is highlighted in Brealey and Myers (1988), who point out that, "*the costs of distress are likely to be greater for firms whose value depends on growth opportunities or intangible assets. These firms*

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[8] For example, Altman (1984) estimates the indirect bankruptcy costs at 17.5 percent of a firm's value one year prior to bankruptcy.

[9] Titman and Wessels (1988) however conclude that there is no significant relationship between leverage ratio and business risk.

[10] Without tangible assets, the cost of borrowing may be prohibitively high since creditors may demand very high discounts or high interest payments as a prerequisite to making the loan.

are more likely to forgo profitable investment opportunities and, if default occurs, their assets may erode rapidly" (p.435).

III. Agency Costs Theories

The agency costs theories were initiated by Jensen and Meckling (1976), building on the earlier work of Fama and Miller (1972). Under the agency costs theories, debt is considered as a necessary mechanism to mitigate the conflict between equity holders and managers. The arguments are that debt financing reduces the amount of free cash available at the managers' disposal (Jensen, 1986; and Hart and Moore, 1995). Debt can also be considered as a mechanism to force liquidation if a firm's cash flow is poor (Williamson, 1988; and Harris and Raviv, 1990), even though managers may always want to continue the firm's current operation, whereas shareholders may be better off by liquidating current operations. Further, managers' tendencies towards empire building can be constrained with debt financing (Stulz, 1990; and Zwiebel, 1996)[11]. Another benefit of debt finance is in creating an incentive for managers to work harder. The argument here is that if bankruptcy is costly for managers, because they lose benefits of control or reputation, then debt can create an incentive for managers to work harder, consume fewer perquisites, and make better investment decisions, because this behaviour reduces the probability of bankruptcy.

Once debt is introduced into capital financing, another type of conflict of interest among agents emerges: the conflict between equity holders and debt holders. Jensen and Meckling (1976) argue that in a highly leveraged firm, the incentives for shareholders to push managers to pursue riskier projects can result in an asset substitution problem[12]; leverage may cause another adverse incentive which is the so-called underinvestment problem, in which case managers, acting in the shareholders' interest, might reject investments which increase the firm's value because the expected gains would accrue largely to creditors (Myers, 1977).

While the agency cost literature is replete with theoretical models, testable implications are limited. One testable implication is that a negative relationship exists between leverage and

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[11] Mangers' tendencies towards empire building may sometimes lead them to carry out negative net present value projects even though paying out cash is a better choice for shareholders.

[12] Because shareholders have limited liability, thy capture most of the gain if the project is successful, while they suffer minimally if the project fails. On other hand, creditors can never receive more than their promised return.

a firm's growth opportunities. Myers (1977) and Titman and Wessels (1988) argue that because growth opportunities are not fully tangible (they are very difficult to monitor and value), creditors demand a relatively high return when providing finance for these opportunities. Thus, firms with significant growth opportunities should use a greater amount of equity finance (Lang, *et al.*, 1996). Similarly, Jensen and Meckling (1976) and Galai and Masulis (1976) argue that firms in growing industries may have greater flexibility in their choice of investments, allowing equity holders greater opportunities to expropriate wealth from bondholders. The costs associated with agency relationships for rapidly growing firms may lead to a preference for equity funds. Another implication is that highly profitable slow-growing firms should have more debt. Large profits without good investment opportunities create the resources to consume perquisites and build empires. Increasing debt reduces the amount of free cash and decreases the manager's fractional ownership of residual claim (Harris and Raviv, 1991).

IV. Asymmetric Information Theories

In their most basic form, asymmetric information theories argue that managers have more information about the firm than do investors. Investors, knowing this, infer that managers are more likely to raise equity when share prices are over-valued. With this understanding, investors price equity issues at a discount. This discounting of share issues can force firms to reject projects even when they have positive net present values[13]. The prohibitive costs of external equity can be sidestepped, however, if firms are able to use retained earnings. Firms can also overcome the problem if they develop a reputation for providing true and accurate information.

Asymmetric information can also generate a premium on debt funds through the same mechanism. Again, the premium on debt can force firms with exhausted internal funds to forego some projects with positive net present values. However, the premium on debt will be less than that on equity because debt contracts involve less risky streams of income. As a result, with information asymmetry, a firm will choose to finance new investment, first internally, then with low risk debt, and finally with equity as a last resort. This is often referred to as the *pecking order theory*. According to this theory the capital structure

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[13] For formal models of this phenomenon see Greenwald *et al.*, (1984) and Myers and Majluf (1984).

choice depends on the firm's investment opportunities and its profitability. Highly profitable firms might be able to finance their growth by using retained earnings and by maintaining a constant leverage ratio. In contrast, less profitable firms will be forced to resort to external financing. In general, profitable slow-growing firms should generate the most cash, but less profitable fast-growing firms will need significant external financing.

The most important implication according to asymmetric information theories is that the underinvestment problem is least severe after information releases such as annual reports and earnings announcements. Therefore equity issues will tend to cluster after such releases and the stock price drop will be negatively related to the time between the release and the issue announcement. Another implication is that firms with comparatively few tangible assets relative to firm value are more subject to information asymmetries. For such firms, then, the underinvestment problem will occur more often than for similar firms with less severe asymmetries. These firms can be expected to base more on debt finance. Finally, as highlighted by Rajan and Zingales (1995) and Pagano and Zingales (2000) this information asymmetry problem is more serious for small firms, which have little track record, than for large firms, so that in the presence of an asymmetric information problem, the probability for a firm to issue equity should be positively related to the size of firm.

8.2.2 Stock Market Development Effects

As we have shown above, the corporate finance theories suggest that firms optimally structure financing packages to reduce the costs that result from taxes and the various imperfections of the financial markets. As financial markets develop, the cost of capital will decrease and firms will have greater access to a broader range of financial instruments. This would be expected to affect the financing policies of firms with increased investment demand.

While differences in financial structure have been noted in the corporate finance literature, there have been very few attempts formally to model the effect of financial market development, especially stock markets, on firms' financial choices. Notable exceptions are Pagano's (1993a) model of the effect of opportunities for diversification on portfolio choice and Boyd and Smith's (1998) framework analysis of debt/equity financing for capital investment.

Following Demirguc-Kunt and Maksimovic (1996), we argue that stock market development can affect a firm's financial choices and investment decisions by mitigating two classes of imperfections: First, the inability of investors and entrepreneurs to diversify their portfolio optimally in stock markets. Second, the asymmetric information problems that occur because stock markets do not perform the information production function efficiently.

In an economy in which stock markets are imperfect, entrepreneurs face the cost of diversifying their portfolio. Investors will demand a higher return for risk. As a consequence of the cost of diversification, the entrepreneur may avoid the use of stock markets and therefore alter the firm's investment policies (Pagano, 1993a, Lehmann, 1997) by several methods: first, the firm may diversify into areas in which it does not have a comparative advantage; second, the firm may be worth less than it would if its shares were widely held; finally, it may choose less capital incentive production technologies that are subject to less long-term risk.

As we have pointed out several times in the previous chapters, in addition to their function of mobilising capital to firms, stock markets have an important information role. Stock markets influence the incentive of agents to acquire and disseminate information about firms. Trading activity among participants produces information which is conveyed through price signals. This information production role of the stock market can mitigate information asymmetry problems and thereby reduce the cost of external capital (Pagano and Zingales, 2000)[14].

In addition to the above arguments, stock market development also can affect a firm's leverage ratio by facilitating the threat of a hostile takeover. It is widely argued that higher leverage decreases the probability that a firm will be taken over in the future because a higher leverage ratio increases the cost of the takeover activity (Israel, 1991). The existing literature suggests two explanations for this relation between leverage changes and the cost of takeover. First, Jensen (1986), Novaes and Zingales (1995), Zweibel (1996) and Safieddine and Titman (1999) argue that an increase in leverage can increase the

[14] Greenwald and Stiglitz (1986, 1990, 1993) provide theoretical models to suggest that a central effect of the informational problems in the capital market, including asymmetries of information between providers of capital and firm managers, is to restrict a firm's ability to raise equity funds in capital markets and this will

credibility of a target manager's promises, which in turn increases the target's stock price, thereby increasing the cost of the takeover. So this explanation implies that increased debt should lead to increased performance[15]. Second, Harris and Raviv (1988) and Stulz (1988) argue that leverage can make a target firm more costly to take over because it increases the percentage ownership of the target's management and therefore improves their bargaining power. Overall, we can conclude that stock markets that facilitate the threat takeover may force managers to increase leverage in order to reduce the probability that the firm will be taken over in the future.

Consequently, as stock markets develop relative to debt markets, we might expect several things to happen. If we assume that firms were previously constrained in their utilisation of equity, stock market development would result in a substitution of equity for debt, primarily because there are certain growth projects that should only be financed through equity issues. This would result in falling leverage ratios. However, the more a stock market develops, the more its takeover function improves, which may force managers to increase leverage as a part of their defence strategies against the increased probability that their firms will be taken over in the future. Another possibility is that the development of the stock market improves information dissemination, which makes it less costly for investors and creditors to monitor firms. This makes both equity and debt less risky, and the change in the debt-equity ratio unknown. It is also possible that the increased ability of a firm to diversify risk may make expansion more attractive. Again, the expected change of debt-equity ratios is unknown.

8.3 Previous Empirical Literature

Many researchers into the topic of corporate finance have focused their attention on a firm's choice between debt and equity. The investigations have tried primarily to identify the determinants of debt-equity ratios. The most comprehensive study in this field has been done by Titman and Wessels (1988). In their study of corporate finance for firms in the US

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affect a firm's behaviour (including that relating to employment, production, pricing, investment that includes inventory changes, and research).

[15] Stein (1988) also shows that increasing the possibility of a takeover increases a firm's incentive to signal its value. Zwiebel (1996) shows that the benefit of debt rests in its ability to constrain managers from inefficient projects. In addition, Safieddine and Titman (1999) find that the operating performance of firms improves following leverage-increasing recapitalisations.

during the period 1974-1982[16], Titman and Wessels identified eight factors that different theories of capital structure have suggested would affect a firm's choice between equity and debt.

The variables selected by Titman and Wessels from the theoretical capital structure include the intangible value of assets, non-debt tax shields, expected future growth, uniqueness, industry classification, firm size, volatility and profitability[17]. They find that uniqueness, firm size and profitability are important for capital structure decisions. These results suggest that large firms in the US have more access to capital markets, and small firms prefer short-term debt. Tax structure is not significant. While the cost of equity is significant (transaction costs), the other factor determining the cost of debt (interest rates) is ignored in this study.

In a recent study, Graham and Harvey (2001) conducted a comprehensive survey to examine capital budgeting, cost of capital, and capital structure for a sample consisting of 4,440 US firms. In their analysis of capital structure, they found that financial flexibility and credit rating were the most important factors in debt policy decisions, and that stock price appreciation was the most important factor influencing equity issuance. The degree of stock undervaluation is also important to equity issuance. They also found little evidence that signalling, transaction costs, underinvestment costs, asset substitution, free cash flow consideration, or product market concerns affect capital structure choice.

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[16] Baxter and Cragg (1970), Taub (1975), Bradley, *et al.*, (1984), Friend, *et al.,* (1988), Givoly, *et al.,* (1992) among others also investigated the determinants of capital structure for U.S. In other studies, Shuetrim, *et al.*, (1993), Colombo (1999), Samuel (1996) and Gallego and Loayza (2000) analysed the capital structure determinants for Australia, Hungary, India and Chile, respectively.

[17] Firms with assets that can be used for collateral will issue more debt. Firms with large non-debt tax shields will issue less debt, as the tax advantage of issuing debt is lower for these firms. In the agency cost theories literature, expected growth is negatively related to long-term debt, since equity-controlled firms will invest sub-optimally in order to expropriate wealth from the firm's bondholders. This agency cost is expected to be higher in large firms. Unique firms will have a higher cost of liquidation if they default. These firms are less likely to issue debt. Uniqueness is measured by the ratio of research and development to sales and the ratio of selling expenses to sales. Firm size is associated with low debt because of market imperfections, large firms may have greater access to capital markets than small firms. As volatility increases, the amount of debt decreases; many of the costs associated with debt are fixed (interest payments) and must be paid whether the firm is profitable or not. Dividends, however, vary with changes in profitability. Titman and Wessels (1988) measure volatility by the standard deviation of the percentage change in operating income. Profitability attempts to represent the "*pecking orde*r" theory, which states that firms rely more heavily on internal than external funds.

In his study of UK firms between 1959 and 1974, Marsh (1982) finds that long-term debt ratios are determined by firm size, bankruptcy risk and asset composition. In a recent study, Bevan and Dabolt (2000) analyse the determinants of capital structure for a sample of 822 UK companies using a variety of gearing measures. They find that the level of gearing in UK companies is positively related to tangibility and size, and negatively correlated with profitability and the level of growth opportunities. In an important study, Rajan and Zingales (1995) investigated the determinants of capital structure for G-7 countries (the US, Japan, Germany, France, Italy, the UK, and Canada). They used four key independent variables to analyse the determinants of capital structures in these countries: the tangibility of assets, market-to-book ratio, logarithm of sales as a size proxy, and a measure of profitability. They found that the factors determining firm leverage were similar across these countries. Particularly, they found that firm size, tangible assets, profitability, and future expected growth were important determinants of capital structure in G-7 countries.

While there are many studies which examine the importance of firm-specific effects in determining a firm's financial structure choices, empirical evidence on the effect of stock market development on capital structure choices made by firms is very limited. In fact, to date only one empirical study has been completed: Demirguc-Kunt and Maksimovic (1996) investigated this issue for thirty developed and developing countries during the period 1980-91.

Using a firm's debt-equity ratio as a measure of corporate capital structure, Demirguc-Kunt and Maksimovic (1996) investigated the extent to which variations in aggregate debt-equity ratios can be explained by stock market development, banking sector development, macroeconomics variables, variations in the tax treatment of different financing instruments, and firm-specific variables that have been identified as crucial to the capital structure choice. They used an aggregate measure of the debt-equity ratio, stock market variables and the banking variables, which were averaged for a period of 1980-91.

Demirguc-Kunt and Maksimovic performed three separate sets of analysis. They began by performing pooled OLS regressions of debt-equity ratios on all the independent variables mentioned above with developed and developing markets aggregate together. They determined that the development of a country's stock market did not explain changes in

capital structure, after other variables had been taken into account. They found that as the financial sector (the banking sector) develops relative to the stock market, firms rely more on debt instruments for new financing.

Then they split the sample into firms in developed and developing countries, and performed the same type of analysis as above. They found that there are significant differences in the ways in which firms in developing countries finance new growth, as compared to their developed country counterparts. In developing countries, they found a significant and positive relationship between stock market development and debt-equity ratios. In their study, they concluded that as a stock market develops, firms in developing economies tend to rely more on debt. Demirguc-Kunt and Maksimovic argue that this a result of increased information sharing and more opportunities for risk sharing, which allows firms to increase their borrowing. They also conclude that in countries with developing financial systems stock markets and banks play complementary roles. In developed countries, debt-equity ratios fall when stock markets develop, indicating that firms in developed countries increase their issuance of new equity as stock markets become more accessible.

Since Demirguc-Kunt and Maksimovic (1996) performed single cross-country regressions, their results suffer from measurement, statistical, and conceptual problems. They have a single set of firms' data for each country averaging, twelve years of data into a single data firm. This method loses information that could be country-specific, firm specific, and/or time-specific[18]. In addition, one potential criticism of their results is that data quality varies across countries due to differences in accounting standards and practices, causing attenuation biases. In this study we address this shortcoming by focusing only on an individual country's experience, that of Jordan, using a panel data methodology.

In addition, in this chapter we address one shortcoming that is common to most of the previous work in this field. The common approach in most empirical capital structure studies has been to study the determinants of optimal leverage by studying the relation between the observed leverage and a set of explanatory variables using non-dynamic models. This approach has two shortcomings. First, the observed leverage may not necessarily be the optimal one. As Myers (1977) points out, changes in capital structure are

[18]We have discussed these shortcomings in detail in the previous empirical chapters.

costly to implement. Hence, the observed leverage at any point in time may substantially differ from its optimal level. Furthermore, Myers and Majluf (1984) suggest that the observed leverage may differ from the optimal level predicted by a trade-off of the costs and benefits of debt. Second, the empirical analysis, being non-dynamic, is unable to shed any light on the nature of the dynamic capital structure of firms. To address these shortcomings, we estimate a dynamic adjustment type model within a panel data set[19]. This model allows for the possibility that at any point in time a firm's observed leverage may not be optimal. In addition, this model allows us to capture the dynamic of capital adjustments, *i.e.* if the firms indeed move toward optimal leverage ratios or away from them, and the speed with which they do that.

Empirically, unlike the existing empirical studies in this field, our analysis is carried out with the GMM for panel data utilising instruments variables. Particularly, we use two GMM dynamic panel estimators: GMM-Difference and GMM-System estimators. One important advantage of using this technique over the traditional ones (OLS) is that it enables consistent estimation in spite of heteroscedasticity and autocorrelation.

8.4 Empirical Model and Variables Measure

8.4.1 Empirical Model

As we have shown above, the theory of capital structure postulated that in a world of imperfect and incomplete financial markets, firms could increase value by changes in their leverage. However, there are costs involved as well in changing leverage, and it is a trade-off between costs and benefits leverage that can imply an interior debt level for a firm (Zwiebel, 1996). The value corresponding to this optimal debt level is the maximum value of the firm given a level of operating cash flow. And the value of firms that are not at their optimal leverage level will be less than the maximum possible.

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[19] It should be noted that we are not the first to recognise the importance of employing a dynamic to study capital structure. Edwin *et al.*, (1989) provided the first attempts empirically to study a firm's dynamic capital structure behaviour. Fisher *et al.*, (1989) also address theoretically the question of firms' dynamic optimal capital behaviour. They argue that the often-used results of static cross-sectional models are questionable if firms follow a dynamic optimal behaviour. In addition, Vilasuso and Minkler (2001) develop a dynamic model of the firm's capital structure where the cost of project finance is affected by both agency costs and the degree of asset specificity exhibited by the investment project. Shuetrim, *et al.*, (1993) empirically address dynamic capital structure by considering a single lag of the leverage in their model. In a more recent empirical study, Graflund (2001) introduces a new approach to testing capital structure on a firm specific level. He uses the Johansen procedure for cointegration testing to test theories of optimal capital structure.

Based on the above, we assume that the optimal debt-equity ratio, Y^*_{it}, is a function of firm characteristics, macroeconomics variables and financial development indicators. For the ith firm at time t, we can formalise this by the following equation:

$$Y_{it}^{*} = \beta_i X_{it} + \gamma_i M_t + \phi_i S_i + \rho_i B_t + \alpha_i + \alpha_t + \varepsilon_{it} \qquad (8.1)$$

such that i=1,…,N, and t=1,…,T. $X_{i,t}$ stands for the variables capturing firm specific characteristics. M_t captures the macroeconomic variables, which vary with time but not across firms. S_t and B_t measure the stock market and the banking sector development variables, respectively, which also only vary with time and not across firms. α_i and α_t represent unobserved firm specific effects and period specific effects, respectively. $\varepsilon_{i,t}$ is white-noise error term ($\varepsilon_{it} \approx iidN(0,\sigma_\varepsilon^2)$).

As can be seen from the above specification the optimal leverage (debt-equity ratio) is allowed to vary across firms and over time. Since the factors that determine a firm's optimal leverage change over time, it is likely that the optimal leverage ratio moves over time even for the same firm. Thus, we capture the dynamic nature of the capital structure problem, which has been overlooked in most of the previous empirical literature[20].

In a perfectly frictionless world with no adjustment costs the firm would immediately respond to a variation in the independent variables by varying its existing leverage ratio to equal its optimal leverage (complete adjustment). Thus, at any point in time, the observed leverage of firm i (Y_{it}) should not be different from the optimal leverage, *i.e.*, $Y_{it} = Y_{it}^*$. This implies that the change in the existing leverage from the previous to the current period should be exactly the change required for the firm to be at optimal leverage at time t, *i.e.* $Y_{it} - Y_{it-1} = Y_{it}^* - Y_{it-1}$. In practice however, the existence of significant adjustment costs means that the firm will not completely adjust its actual leverage to Y^*. Thus, with less than complete adjustment, the firm's observed leverage ratio at any point in time would not equal its optimal leverage ratio. We can represent this by a partial adjustment model as[21]

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[20] Most previous empirical studies have employed a single set of firms' data by averaging number of years of data into a single firm data.

[21] Marc Nerlove provided this model in 1958 (Gujarati, 1995). Nowadays this model is commonly used in empirical studies; for example, Sharpe (1994) used this model to investigate the effect of a firm's financial policy on the cyclicality of its labour force. Bhatacharya and Bloch (2000) used this model to test industrial concentration in Australian Manufacturing. Haynes *et al.,* (2000) used it to determine the factors effect on

$$Y_{it} - Y_{it-1} = \lambda_{it}(Y_{it}^{*} - Y_{it-1}) \qquad (8.2)$$

where λ_{it}, is known as the coefficient of adjustment or the speed of adjustment.

Equation (8.2) postulates that the actual change in leverage ratio at any point in time for firm i is the some fraction λ of the optimal change for that period. If λ_{it}=1, it means that the actual leverage ratio is equal to the optimal leverage; that is, actual leverage adjusts to the target leverage instantaneously and continuously *i.e.,* for all t a firm shall consistently be at its target leverage. If λ_{it},<1, it means the adjustment from the period t-1 to t falls short of the adjustment required to attain the target. However, if λ_{it}>1, it means that the firm makes adjustment more than is necessary and yet is still not at the target level (over-adjustment).

Note that the above partial adjustment model can alternatively be written as

$$Y_{it}=(1-\lambda_{it})Y_{it-1}+\lambda_{it}Y_{it}^{*} \qquad (8.3)$$

substituting from equation (8.1) into equation (8.3) to remove the unobservable optimal leverage, Y_{it}^{*}, gives the following empirical model:

$$Y_{it}=(1-\lambda_{it})Y_{it-1}+\lambda_{it}(\beta_i X_{it}+\gamma_i M_t+\varphi_i S_i+\rho_i B_t+\alpha_i+\alpha_t+\varepsilon_{it}) \qquad (8.4)$$

Since equation (8.1) represents the optimal, or long-term firm leverage, equation (8.4) represents the short run firm leverage since the actual or existing leverage ratio may not be equal to its optimal leverage. When an equation in the form of (8.4) is estimated, the coefficient of the observed lagged leverage variable, Y_{it-1}, gives the estimate of one minus the partial adjustment. If the coefficient value of the lagged leverage ratio is greater than zero we can conclude that the adjustment from period t-1 to t falls short of the adjustment required to attain the target, but if the coefficient is less than zero then the firm over-adjusts in the sense that it makes more adjustment than is necessary and still does not reach the target. The coefficients of the remaining explanatory variables are estimates of the long-run impact multiplied by the partial adjustment.

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corporate divestment in the UK. For more detailed information about this model and how to estimate see for

As mentioned before, however, the main objective of this chapter is to determine the impact of stock market development on the financial choices of Jordanian firms. Thus, our explanatory variable whose influences we are interested in is the stock market development variable (S_t). A negative coefficient for the stock market variable indicates that a firm's leverage decreases with more development in the stock market. If the coefficient is positive, however, this implies complementarities between debt and equity finance. If the coefficient is not significant, we can conclude that stock market development does not affect the financing choice of firms.

8.4.2 Variables Measure

8.4.2.1 Determinants of Financial structure

We use proxy variables to measure the variables determining the firm's capital structure. We can classify these variables into three categories: financial market development variables, individual firm characteristics variables and macroeconomic variables.

I. Financial Market Development Variables

In the absence of a perfect measure of financial market development, we use empirical indicators that proxy relatively well to stock market and banking sector development. We use four indicators to measure stock market development and one indicator to measure banking sector development. Our stock market development indicators are the ratio of stock market capitalisation to GDP (market capitalisation ratio), the ratio of total value traded to GDP (value-traded ratio), the ratio of the total value of shares traded to market capitalisation (turnover ratio), and the annualised standard deviation that is based on weekly market returns (volatility). Market capitalisation ratio is a measure of both the stock market's ability to allocate capital to investment projects and to provide significant opportunities for risk diversification for investors. Value-traded and turnover ratios are indicators of the ability of the market to trade significant positions (liquidity). High share price volatility may raise the cost of equity capital and cause the information role of the stock market to deteriorate. Our measure of banking sector development is the ratio of domestic credit to the private sector to the GDP. This ratio measures the ability of the

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example Patterson (2000).

banking sector to provide credit to the corporations. These indicators of stock market and banking sector development have been used in the previous empirical chapters of this study.

II. Individual Firm Characteristics Variables

The variables described in the capital structural theories are not observable. However, the basic approach that has been taken in previous empirical studies is to try to identify certain proxies for the unobservable theoretical attributes. As Titman and Wessels (1988) have explained, this approach certainly has its limitations. First, there may be some attributes which cannot be well represented by available proxies, or there may be several proxies that can be used for certain attributes. Secondly, the attributes themselves can be related as well, so the proxies' chosen may actually measure the effects of several different attributes. Thirdly, measurement errors in the proxy variables may be correlated with measurement errors in the dependent variables thus creating spurious correlations[22].

In this study we focus on the following five attributes that are most commonly used in the empirical studies[23]: asset tangibility, growth, size, profitability and cost of equity capital.

a. Asset Tangibility

In an uncertain world, with asymmetric information, the asset structure of a firm has a direct impact on its capital structure since a firm's tangible assets are the most widely accepted sources for bank borrowing and raising secured debt. If banks have imperfect information regarding the behaviour of the firm, firms with little tangible assets find it difficult to raise funds via debt financing. In addition, as discussed above, it is posited by some researchers that firms with a higher bankruptcy risk and higher liquidation costs will issue less debt. Firms with more intangible assets will have higher liquidation costs (Johnson, 1997). Therefore, firms with higher tangible assets will have lower liquidation costs and will issue more debt. Overall, we predict that we shall see a positive relationship between tangible assets and leverage. We use the ratio of tangible asset to total asset for the tangibility attribute. We use the sum of fixed assets and inventories as tangible assets.

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[22] However, we address the two latest problems in our empirical analysis by using GMM dynamic panel estimators (see Chapter VII).
[23] See Harris and Raviv (1991) and Rajan and Zingales (1995).

b. Size

Many researchers have found that firm size has an effect on access to capital markets. Firm size is an important consideration in the ability of firms to raise capital through debt or stock market. In order to be consistent with the existing literature, firm size is proxied by the logarithm of total assets. The expected sign of the coefficient of this variable is unclear. Large firms, which are more diverse and have a lower probability of being distressed, can sustain more debt than small firms. However, if there are substantial market imperfections, large firms may have greater access to equity markets (Rajan and Zingales, 1995; Pagano and Zingales, 2000; Paranque, 2000; and Shin and Stulz, 2000). In addition, transaction costs for new equity issues are higher for small firms, thus encouraging a greater reliance on debt (Fama and Jensen, 1993; and Kadapakkam *et al.,* 1998). Ritter (1987) has also found that there are economies of scale in issuing shares, as large firms have more access to equity markets.

c. Growth

The agency theory predicts a negative relationship between growth and leverage. Myers' (1977) underinvestment problem suggests a negative relationship between profitable investment opportunities and long-term debt. The argument is that a firm's growth opportunities are intangible assets instead of tangible assets; the cost of financial distress which is associated with high leverage may affect a firm's ability to finance its future growth. So managers of firms with valuable growth opportunities should choose low leverage. Lang *et al.,* (1996) assert that, "*Management chooses leverage based on its private information about future firm growth. ... management of firms with valuable growth opportunities should choose lower leverage because these firms might not be able to take advantage of their investment opportunities if they have to raise outside funds. Consequently, we could observe a negative relation between future growth and leverage because management of firms with good growth opportunities choose low leverage*" (p.3). Zweibel (1996) also points out that, "*the better a manager's investment opportunities, the less debt a firm will have ...firms in new rapidly expanding industries, for which many good new investments are likely to be available, should have less debt than other firms*" (p. 1210). As suggested by Myers (1977) and Smith and Watts (1992) and following Rajan and Zingales (1995) and Lang *et al.,* (1996), we use Tobin's Q as a proxy for firm's growth

opportunities[24]. Tobin's Q is measured by (total asset-equity book value + year end stock price × number of shares outstanding)/ total assets.

d. Profitability

Researchers have different views on the relationship between leverage and profitability. The pecking order theory suggests that firms which are more profitable will have less leverage, and will instead rely more on internal finance. However, asymmetric information theories argue that the choice of the firm's capital structure signals to outside investors the information of insiders, in which case investors take larger debt levels as a signal of good performance by the firm and of the management's confidence. According to this argument, the firm's value (or profitability) and leverage must be positively related. We use operating income before interest and taxes to total assets as our indicator of profitability.

e. Cost of Equity

One of the most important factors that affect a firm's financial decisions is the cost of equity funds. One would expect that as the cost of equity increases the firm should issue less equity. The cost of equity capital is a difficult concept to define and measure (Bekaert and Harvey, 2000). As a result it is measured in a variety of ways by different firms. The source of the difference of opinion is that payments to equity holders vary over time and involve no principle repayment; risk and an indefinite life are two important characteristics of equity. For that reason, many firms look at the growth rate of earnings, the ratio of dividend paid to price, as a measure of equity cost[25]. The share price can be calculated in one of two ways: the market value of equity or the book value of equity. The book value of equity, while easy to calculate, is backward looking and is not the relevant price for a new issue. Using the market share price at the time of issue resolves this problem. However, there is an additional criticism of these measures. Investors expect part of the return on their investment to be paid in the form of future share price increases. These expectations of increase in share prices must be related to an expectation of future payouts in dividends

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[24] Tobin's Q is also used as a rough measure of agency costs because it captures the changing relationship between future investment opportunities and existing assets (Graflund, 2001).
[25] Bekaert and Harvey (2000) and Bekaert, et al., (2000a,b,c) used the dividend yield to measure the cost of capital equity changes pre- and post- stock market liberalisation in 20 emerging markets.

as well, since equity is not repaid as debt[26]. Consequently, in order for firms and investors to have comparable views, firms must consider not only current dividend yield, but also expected growth in future dividends. Using dividend yield alone as a measure of return on equity is likely to induce management to believe that equity is cheaper than debt, a belief that ignores that the extra risk shareholders bear and for which they demand compensation[27].

An alternative measure of the cost of equity is the price-earnings (P/E) ratio. An increase in the P/E ratio indicates a lower cost of equity finance for the firm[28]. Both the P/E ratio and the dividend yield predict the same changes in the cost of equity for given changes in market share prices. When share prices increase, the cost of equity falls. However, for emerging markets including Jordan, the P/E ratio is the most accepted measure of equity cost[29]. Therefore, consistent with this view, we use the P/E ratio as a measure of the cost of equity.

III. Macroeconomic Variables

The capital structure is not just a function of a firm's characteristics and financial market development: macroeconomic variables are also important for financing patterns. Corporate finance theories suggest that the growth rate of real GDP and inflation affect the availability of long-term instruments. The growth rate of real GDP is a measure of the growth opportunities available to domestic companies, and because corporate finance theories suggest that growth opportunities should not be financed by debt[30], it is predicted that firms with higher rates of growth will rely less on debt instruments[31].

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[26] This view is consistent with markets in the US and most other developed countries. For example, investors in the NASDAQ market are not only interested in the dividend yield but also in the expected future share prices.

[27] See Myers (1977) for a more complete discussion of this issue.

[28] A P/E ratio of 22 indicates that it cost JD22 to purchase JD1 of profit. In this example, cost of equity is 4.5 percent.

[29] Other methods of measuring the cost of equity finance are the financial pricing models (CAPM, APM, intertemporal model, market factor model). While these models have been extensively used in the study of developed stock markets, many studies argue that financial pricing models are not appropriate methods to measure the cost of equity in emerging markets (see for example, Bekaert and Harvey, 1995a,b; Bakaert and Harvey, 1997; Bekaert *et al.,* 1997; and others). In addition, many studies argue that firms' managers in emerging markets, including Jordan, do not use these type of models to measure the cost of equity capital; instead, they use the P/E ratio (see for example, Glen and Pinto, 1994; Singh, 1995; and Aylward and Glen, 1999).

[30] See for example Zwiebel (1996).

[31] In addition, Gelb (1989) has found that real equity prices are influenced by the economic growth rate.

Because higher rates of inflation increase the risk, the typical investor will require a higher nominal rate of return. Therefore a higher rate of inflation will increase the cost of issuing debt, and so firms will be less likely to rely on debt. On the other hand, high inflation may have resulted in a shortage of long-term debt instruments. Therefore, firms would have no choice but to rely more heavily on debt instruments, if they tap external markets for finance. The net indication of the above consideration is that the effect of inflation on leverage is ambiguous.

In addition to economic growth and inflation, an aggregation of real the cost of debt may influence firms' financial decisions. When the real cost of debt is increased given the level of equity cost, we should expect that a firm would rely more on equity finance. We use the real interest rate as a measure of the cost of debt. The real rate of interest is measured as the nominal rate of interest minus the inflation rate.

8.4.2.2 Financial Structure

In this study, we use two measures of financial leverage as dependent variables: one is the total debt divided by equity book value (LEVB) and the other is the total debt divided by equity market value (LEVM)[32]. Equity market value is measured as the product of year-end stock price and the number of shares outstanding. There are two reasons behind the choice of both book value and market value leverage. First, various capital structure theories have not specified which leverage measurement should be used. Second, for the purpose of being consistent, most empirical studies have used both book value leverage and market value leverage.

8.5 Data and Summary Statistical Analysis

Essentially the same firm sample is being used in this chapter as in Chapter VII of this study. Particularly, our firm sample contains panel data for 56 industrial firms listed on the AFM over the period 1988-98. Financial accounting data for each of the firms in the

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[32] Many other studies employed the market value of debt. This is not applicable in this case as the corporate bond market in Jordan has been more or less non-existent. The financing of Jordanian companies is mainly carried out via mortgage and by issuing equity. In addition, Titman and Wessels (1988) point out that, "*the cross-sectional correlation between the book value and market value of debt is very large, so the misspecification due to using book value measures is probably fairly small. Furthermore, we have no reason to suspect that the cross-sectional differences between market values and book values of debt should be correlated with any of the determinants of capital structure suggested by theory, so no obvious bias will result because of this misspecification*" (p.7).

sample come from the "*Guide of the Publicly Held Corporations*" published annually by the AFM.

Table (8.1) provides summary descriptive statistics for the variables used in this chapter over the period 1988-98. As can be seen, for all the firm-level variables, the mean is higher than the median. Hence, the data is characterised by positive skewness. This is a normal phenomenon in panel data firm studies.

Table 8.1: Summary Statistics

	Mean	Median	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
TEVB	1.08	0.898	1.282	1.253	6.090	13.48 (0.001)
TEVM	0.881	0.420	1.025	1.426	8.168	25.31 (0.000)
MCR	65.97	65.80	12.82	0.490	2.030	0.882 (0.643)
VTR	18.64	15.73	8.94	0.924	2.787	2.24 (0.325)
TOR	16.87	13.30	11.00	1.250	3.580	3.038 (0.218)
VOL	10.17	9.80	2.06	-0.060	2.440	0.149 (0.928)
BCR	59.59	59.79	13.03	0.290	1.724	0.904 (0.636)
AT	0.437	0.365	0.359	3.880	18.51	46.362 (0.000)
SIZE	16.21	15.959	1.524	0.544	3.250	7.548 (0.022)
GROWTH	1.597	1.484	0.635	1.253	5.110	12.452 (0.001)
PROF	0.070	0.064	0.061	0.235	3.971	7.042 (0.029)
PER	19.258	16.548	18.620	2.120	7.257	18.279 (0.000)
RGDPG	2.830	2.100	7.129	-0.338	4.677	1.500 (0.472)
INFR	7.481	3.900	7.170	1.730	4.781	6.944 (0.031)
RINT	5.585	9.390	7.090	-1.449	4.050	4.403 (0.111)

LEVB is the financial leverage (total debt divided by equity book value). LEVM is the financial leverage (total debt divided by equity market value). MCR is the stock market capitalisation ratio. VTR is the stock market value traded ratio. TOR is the stock market turnover ratio. VOL is the stock market volatility. BCR is the ratio of banking sector credit to private sector to GDP. AT is the asset tangibility (the sum of fixed assets and inventories to total asset). SIZE is the logarithm of total assets. GROWTH is the measure of growth opportunities and is equal to (total assets-equity book value + year end stock price number of shares outstanding)/(total assets). PROF is the profitability (operating income before interest, taxes to total asset). PER is the price-earning ratio. RGDPG measures economic growth (real GDP growth). INFR is the inflation rate. RINT is the real interest rate (measures cost of debt).

Table 8.2: Correlation Among Variables

	LEVB	LEVM	MCR	VTR	TOR	VOL	BCR	AT	SIZE	GROWTH	PROF	PER	RGDPG	INFR	RINT
TEVB	1.000	0.598 (0.000)	0.131 (0.009)	0.124 (0.008)	0.193 (0.000)	0.083 (0.053)	0.118 (0.011)	0.117 (0.006)	-0.282 (0.000)	-0.064 (0.087)	-0.161 (0.000)	-0.098 (0.019)	-0.100 (0.025)	0.038 (0.230)	-0.085 (0.049)
TEVM		1.000	0.117 (0.037)	0.101 (0.025)	0.121 (0.015)	0.089 (0.042)	0.172 (0.000)	0.127 (0.005)	-0.241 (0.000)	-0.421 (0.000)	-0.341 (0.000)	-0.173 (0.000)	-0.103 (0.023)	0.002 (0.485)	-0.055 (0.142)
MCR			1.000	0.200 (0.000)	0.230 (0.000)	-0.360 (0.000)	0.500 (0.000)	0.002 (0.484)	0.011 (0.414)	0.050 (0.163)	0.054 (0.147)	0.051 (0.164)	0.500 (0.000)	-0.400 (0.000)	-0.550 (0.000)
VTR				1.000	0.482 (0.000)	-0.400 (0.000)	0.800 (0.000)	0.012 (0.428)	-0.011 (0.260	0.291 (0.000)	0.121 (0.009)	0.137 (0.004)	0.800 (0.000)	-0.500 (0.000)	-0.400 (0.000)
TOR					1.000	-0.430 (0.000)	0.860 (0.000)	0.022 (0.335)	-0.051 (0.160)	0.324 (0.000)	0.121 (0.009)	0.142 (0.001)	0.890 (0.000)	-0.562 (0.000)	-0.490 (0.000)
VOL						1.000	-0.200 (0.000)	0.005 (0.459)	0.013 (0.401)	-0.201 (0.000)	-0.097 (0.030)	-0.080 (0.060)	-0.600 (0.000)	0.200 (0.000)	0.200 (0.000)
BCR							1.000	0.024 (0.320)	-0.050 (0.166)	0.248 (0.000)	0.098 (0.028)	0.158 (0.001)	0.600 (0.000)	-0.200 (0.000)	-0.200 (0.000)
AT								1.000	0.022 (0.319)	-0.074 (0.057)	-0.121 (0.005)	0.014 (0.388)	-0.013 (0.403)	0.004 (0.472)	0.022 (0.332)
SIZE									1.000	-0.027 (0.286)	-0.045 (0.167)	0.020 (0.335)	-0.040 (0.218)	-0.005 (0.464)	0.037 (0.236)
GROWTH										1.000	0.420 (0.000)	0.232 (0.000)	0.258 (0.000)	-0.045 (0.191)	-0.176 (0.000)
PROF											1.000	-0.020 (0.335)	0.103 (0.023)	-0.029 (0.288)	-0.079 (0.062)
PER												1.000	0.101 (0.025)	-0.117 (0.012)	-0.054 (0.146)
RGDPG													1.000	-0.200 (0.000)	-0.280 (0.000)
INFR														1.000	-0.220 (0.000)
RINT															1.000

(P-values are given in parentheses). LEVB is the financial leverage (total debt divided by equity book value). LEVM is the financial leverage (total debt divided by equity market value). MCR is the stock market capitalisation ratio. VTR is the stock market value traded ratio. TOR is the stock market turnover ratio. VOL is the stock market volatility. BCR is the ratio of banking sector credit to private sector to GDP. AT is the asset tangibility (the sum of fixed assets and inventories to total asset). SIZE is the logarithm of total assets. GROWTH measure of growth opportunities and is equal to (total assets-equity book value + year end stock price number of shares outstanding)/ (total assets). PROF is the profitability (operating income before interest, taxes to total asset). RGDPG measures economic growth (real GDP growth). INFR is the inflation rate. RINT is the real interest rate (measures cost of debt).

The correlation matrix among the variables used in this chapter is presented in Table (8.2). Both measures of leverage ratios- total debt/equity book value (LEVB) and total debt/equity market value (LEVM)- are positively and significantly correlated (at the five-percent level) with each of the capital market capitalisation ratio (CMR), value-traded ratio (VTR) and turnover ratio (TOR), indicating that more development in the stock market is associated with more debt financing relative to equity. This relation is consistent with a priori expectations that further development of the stock market leads to opportunities for risk sharing and aggregation of information that allows firms to increase their borrowing and encourages creditors to increase their lending. Therefore, the development of the stock market could indicate the maturity of the financial sector as whole, which allows firms to issue more equity and debt. Both leverage measures are also positively correlated with stock market volatility (VOL), indicating that with more volatility in stock market prices firms will rely on banks to satisfy their financing needs. Moreover, the correlation between the banking sector development indicator (BCR) and both leverage ratio measures is positive, which suggests that a more developed banking sector will lead to a greater reliance on debt.

As can be seen from Table (8.2) also, there are positive correlations between both the leverage ratio measures and the tangible assets (AT). Moreover, both measures of leverage ratio are negatively correlated with the firm size (SIZE), the operating income (PROF), the market to book ratio (GROWTH), the price-earning ratio (PER), the real interest rate and real GDP growth (RGDPG). The leverage measures are also positively correlated with the inflation rate (INF); however, the relation is not significant at the five-percent level.

8.6 Empirical Results

Model (8.4) is estimated using two alternative versions of dependent variables *i.e.* book and market value measures of leverage, and in each version of dependent variable we generated alternative versions of stock market development; this is alternatively measured as the stock market capitalisation ratio, value-traded ratio, turnover ratio and the market volatility. The regression equations estimated here are dynamic in that they lagged dependent variables and explanatory variables that are likely to be endogenous/or correlated with firm-specific effects. As in the previous empirical chapter, we use the GMM dynamic panel technique, with both difference and system estimators. We use

instruments dated t-2 and earlier. These estimators permit us to overcome the statistical problems that are associated with unobserved individual effects, endogeneity of explanatory variables, and the use of lagged dependent variables. We present only two step-GMM estimators, since they are more efficient than one-step estimators, and since only the Sargan test of overidentifying restrictions is heteroscedasticity-consistent only if based on the two-step estimators. In Table (8.3) the results of both the difference and system GMM dynamic panel estimators for the book value leverage measures (LEVB) with the alternative measures of stock market development are given. Table (8.4) gives the results from both the techniques for the market value leverage measures (LEVM) with the same alternative specifications of stock market development variables.

Before discussing the coefficient estimates, we have to discuss some specification tests since the validity of our results depends upon the consistency of the GMM-estimators we used. We are interested mainly in the two statistical tests which are reported in Tables (8.3) and (8.4): (1) the serial correlation test, where the null hypothesis is that the errors in the differenced equations exhibit no second-order serial correlation; and (2) the Sargan test, where the null hypothesis is that the instrumental variables are uncorrelated with the residuals.

As can be seen from Table (8.3), for regressions with LEVB, there is no evidence of second-order serial correlation and the regressions pass the Sargan specification tests. In the system dynamic panel estimators, we do not reject the difference Sargan tests for the validity of additional instruments; that is, we do not reject the assumption that the firm-specific effect is uncorrelated with the difference of the regressors. Overall, the test statistics for the regressions with LEVB support the statement that our results from both difference and system dynamic panel estimators do not suffer from endogeneity problems and unobserved firm specific effects. For the regressions with LEVM (Table 8.4), both second-order serial correlation and Sargan tests do support the use of the difference dynamic panel estimators in which neither test rejects the differenced error terms are not second-order serially correlated and the orthogonality conditions at the ten-percent level. However, the difference Sargan tests for the validity of the additional instruments do not support the use of the system dynamic panel estimators for the LEVM regressions in which the data reject the orthogonality conditions at the five-percent level. These results imply that the differences in the right-hand side variables are correlated with the unobserved firm

specific effects, so that we cannot assume that the additional moment restrictions used in the system estimation for LEVM regressions hold[33].

We now discuss the coefficient estimates of the alternative specifications of the dynamic adjustment capital structure model (equation 8.4). We first describe the adjustment coefficients (coefficients of lagged dependent variables). These coefficients allow us to determine whether firms' observed leverage is different from their target leverage and whether firms do move towards target debt-equity ratios (or away from them) and the speed with which they do that. Second, we analyse the effects of firm specific characteristics and macroeconomic variables on financial structure choice, and compare our results with the existing literature. Finally, we discuss the main issue of this chapter which is the effect of stock market and banking sector development on the firms' financing choices. It is worth noting here that the results given in Tables (8.3) and (8.4) show a considerable consistency across specifications and with either version of the leverage measure, with few exceptions.

The results show that, in both the difference and system dynamic panel regressions, the coefficients of lagged book and market value measures of leverage across specifications enter significantly and greater than zero at any level of significance. These results clearly indicate that Jordanian firms always under-adjust in the sense that they fall short of the adjustment required to attain the target leverage levels. In other words, these results indicate that Jordanian firms have capital structures that are not at the target. The conclusion that one can deduct from this result suggests that the financial market imperfections constitute a potential serious problem in Jordan during the period under investigation (1988-98). This implication is reflected in the inability for the Jordanian firms in achieving their optimal capital. The economic instability that characterized the Jordanian economy during the late of 1980s and the early of 1990s could be a very good reason for these imperfections: in presence of an unstable economic system current performance are a very poor indicator for future performances. Therefore, not only borrowers do not have any reputation driving from the past, but also they have relevant difficulties in building one. In this situation the information problems that are likely to

[33] This calls for some caution with respect to the interpretation of the estimation results.

emerge may cause serves forms of credit rationing and may in general create impediments to firms in achieving what they consider to be their optimal capital structure.

Regarding the speed of adjustment, the results, however, did not provide us with a clear picture of the speed with which Jordanian firms move towards the target ratios. In these regressions the estimated coefficients of lagged leverage that emerge from the difference estimator are not similar in order of magnitude to those that obtained from the system estimator. For example, the lagged value of LEVB has coefficients of about 30 percent which corresponds to a partial adjustment of about 70 percent (the partial adjustment is 1 minus the estimated coefficient of the lagged dependent variable) in the difference results, while in the system results this variable has coefficients of about 52 percent which corresponds to a partial adjustment of about 48 percent. As we can show, in these two estimators the speed of adjustment coefficients in the difference estimators is quite a lot higher than the speed of those in the system one. The difference between these two estimators is not negligible[34].

As shown by Tables (8.3) and (8.4), both techniques give a considerable consistency of results across specification and with either version of leverage measure with respect to the firm's specific characteristics and macroeconomic variables. The variable related to the tangibility of assets, the sum of fixed assets and inventors over total assets, is positively and statistically significant in most regressions for both LEVB and LEBM. This implies that firms with more tangible assets have more total debt than firms with fewer tangible assets. This result is consistent with the view that there are various costs (agency costs and expected bankruptcy/financial distress costs) associated with the use of debt funds and these costs may be moderate by collateral. Firms with high quality collateral can obtain debt at a lower premium because of the greater security for creditors. This result is also consistent with the evidence reported in Titman and Wessels (1988), Rajan and Zingales (1995), Demirguc-Kunt and Maksimovic (1996), and Bevan and Dabolt (2000).

[34]In the difference results the coefficient of the lagged value of LEVM is estimated by about 18 percent which corresponds to a partial adjustment of about 82 percent, while in the system results this variable has coefficients of about 34 percent which corresponds to a partial adjustment of about 64 percent.

Table 8.3: Capital Structure (LEVB) and Stock Market Development: Dynamic Panel Regressions

Independent Variables	GMM-DIFFERENCE Estimator				GMM-SYSTEM Estimator			
	1	2	3	4	5	6	7	8
Lagged Dependent Variable	0.3092 (27.50) [0.000]	0.3093 (27.30) [0.000]	0.3099 (28.00) [0.000]	0.3163 (29.00) [0.000]	0.5035 (66.30) [0.000]	0.5242 (75.70) [0.000]	0.5274 (79.20) [0.000]	0.5370 (55.70) [0.000]
MCR	0.0212 (2.37) [0.021]				0.0206 (2.08) [0.040]			
VTR		0.0351 (2.27) [0.026]				0.0378 (4.99) [0.000]		
TOR			0.0162 (2.62) [0.011]				0.0205 (4.03) [0.001]	
VOL				0.0025 (2.17) [0.033]				0.0002 (0.299) [0.976]
BCR	0.0476 (4.27) [0.000]	0.0577 (3.66) [0.000]	0.0489 (4.62) [0.000]	0.0350 (4.43) [0.000]	0.0475 (3.08) [0.030]	0.0522 (3.93) [0.000]	0.0330 (3.01) [0.003]	0.0440 (4.56) [0.000]
AT	0.0592 (1.12) [0.266]	0.0616 (1.15) [0.253]	0.0613 (1.45) [0.152]	0.0643 (1.89) [0.060]	0.0712 (4.08) [0.000]	0.1220 (4.20) [0.000]	0.0127 (5.46) [0.000]	0.0195 (5.81) [0.000]
SIZE	-0.0506 (-2.33) [0.032]	-0.0565 (-2.34) [0.021]	-0.0681 (-2.56) [0.012]	-0.0472 (-2.20) [0.036]	-0.0346 (-3.96) [0.000]	-0.0250 (-2.78) [0.006]	-0.0226 (-2.62) [0.008]	-0.0207 (-2.35) [0.020]
GROWTH	-0.0453 (- 2.21) [0.013]	-0.0426 (-2.15) [0.051]	-0.0518 (-2.00) [0.047]	-0.0512 (-2.90) [0.005]	-0.1668 (-2.29) [0.024]	-0.1642 (-2.38) [0.029]	-0.1381 (-3.16) [0.002]	-0.176 (-2.23) [0.028]
PROF	-0.0178 (-0.230) [0.819]	-0.0404 (-0.364) [0.692]	-0.0182 (-0.247) [0.811]	-0.098 (-0.94) [0.350]	-0.1043 (-3.22) [0.001]	-0.1320 (-3.48) [0.000]	-0.215 (-3.78) [0.000]	-0.197 (-2.15) [0.034]
PER	-0.00055 (-6.19) [0.000]	-0.00057 (-6.95) [0.000]	-0.00055 (-7.00) [0.000]	-0.0005 (-3.96) [0.000]	-0.0007 (-2.63) [0.010]	-0.00141 (-2.76) [0.007]	-0.00179 (-4.04) [0.000]	-0.0012 (-3.96) [0.000]
RGDPG	-0.1198 (-1.49) [0.146]	-0.0657 (-1.73) [0.087]	-0.0647 (-1.57) [0.127]	-0.0542 (-1.44) [0.151]	-0.0839 (-1.95) [0.054]	-0.0442 (-1.55) [0.123]	-0.0624 (-1.82) [0.068]	-0.072 (-1.28) [0.203]
INFR	0.1834 (1.03) [0.305]	0.2245 (1.69) [0.095]	0.0744 (0.984) [0.327]	0.1131 (1.96) [0.052]	0.1638 (2.22) [0.028]	0.0825 (1.28) [0.204]	0.0814 (1.23) [0.216]	0.1434 (1.69) [0.094]
RINT	-0.0572 (-2.77) [0.006)	-0.0634 (-2.76) [0.007]	-0.0122 (-0.32) [0.667]	-0.0130 (-3.34) [0.001]	-0.0235 (-4.34) [0.000]	-0.0157 (-1.98) [0.049]	-0.0187 (-1.69) [0.092]	-0.0354 (-2.87) [0.005]
1st Order Serial Correlation LM (1)	[0.041]	[0.037]	[0.038]	[0.041]	[0.036]	[0.039]	[0.044]	[0.050]
2nd Order Serial Correlation LM (1)	[0.713]	[0.698]	[0.688]	[0.690]	[0.757]	[0.771]	[0.667]	[0.773]
Joint Test of Significance	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Sargan Test	[0.885]	[0.886]	[0.887]	[0.917]	[0.943]	[0.938]	[0.717]	[0.505]

Numbers in Parentheses are t-values and numbers in Brackets are p-values. GMM-DIFFERENCE and GMM-SYSTEM regressions estimated by using DPD99 package for Ox. LEVB is the financial leverage (total debt divided by equity book value). LEVM is the financial leverage (total debt divided by equity market value). MCR is the stock market capitalisation ratio. VTR is the stock market value traded ratio. TOR is the stock market turnover ratio. VOL is the stock market volatility. BCR is the ratio of banking sector credit to private sector to GDP. AT is the asset tangibility (the sum of fixed assets and inventories to total asset). SIZE is the logarithm of total assets. GROWTH measures the growth opportunities and is equal to (total assets-equity book value + year end stock price number of shares outstanding)/ (total assets). PROF is the profitability (operating income before interest, taxes to total asset. PER is the price-earning ratio. RGDPG measures economic growth (real GDP growth). RINT is the real interest rate (measures cost of debt).

Table 8.4: Capital Structure (LEVM) and Stock Market Development: Dynamic Panel Regressions

Independent Variables	GMM-DIFFERENCE Estimator				GMM-SYSTEM Estimator			
	1	2	3	4	5	6	7	8
Lagged Dependent Variable	0.1806 (34.60) [0.000]	0.1758 (37.8) [0.000]	0.1889 (25.70) [0.000]	0.2001 (20.60) [0.000]	0.3270 (67.20) [0.000]	0.3463 (57.60) [0.000]	0.3929 (53.20) [0.000]	0.3330 (67.70) [0.000]
MCR	0.0043 (4.93) [0.000]				0.0037 (2.16) [0.032]			
VTR		0.0208 (6.17) [0.000]				0.0345 (7.38) [0.000]		
TOR			0.0066 (5.35) [0.000]				0.0025 (2.02) [0.045]	
VOL				0.0604 (4.34) [0.000]				0.0147 (3.65) [0.000]
BCR	0.0179 (7.81) [0.000]	0.0180 (4.04) [0.000]	0.0189 (6.47) [0.000]	0.0339 (9.03) [0.000]	0.0085 (2.86) [0.005]	0.00418 (1.61) [0.109]	0.00708 (4.94) [0.000]	0.0095 (7.78) [0.250]
AT	0.1848 (5.03) [0.000]	0.2024 (3.48) [0.001]	0.2440 (4.04) [0.000]	0.1144 (3.28) [0.001]	0.0829 (2.46] [0.015]	0.0685 (2.01) [0.046]	0.0070 (1.04) [0.301]	0.0614 (3.54) [0.001]
SIZE	-0.1214 (-1.57) [0.120]	-0.1214 (-1.57) [0.120]	-0.0847 (-6.17) [0.000]	-0.0858 (-6.43) [0.000]	-0.1084 (-3.83) [0.000]	-00933 (-3.49) [0.001]	-0.0785 (-3.88) [0.000]	-0.0122 (-3.41) [0.001]
GROWTH	-0.2220 (-5.50) [0.000]	-0.1064 (-3.65) [0.000]	-0.1491 (-4.69) [0.000]	-0.2625 (-7.54) [0.000]	-0.0584 (-4.67) [0.000]	-0.0900 (-4.64) [0.000]	-0.0232 (-1.07) [0.287]	-0.0115 (-0.495) [0.622]
PROF	0.0411 (0.682) [0.548]	0.0282 (0.276) [0.783]	0.0215 (0.227) [0.821]	-0.0955 (-3.48) [0.001]	-0.0964 (-3.23) [0.002]	0.0274 (1.39) [0.168]	-0.0480 (-3.01) [0.003]	-0.0487 (-3.10) [0.002]
PER	-0.00079 (-4.49) [0.000]	-0.00066 (-3.30) [0.001]	-0.00111 (-3.96) [0.000]	-0.0014 (-4.87) [0.000]	-0.00287 (-5.95) [0.000]	-0.00658 (-8.30) [0.000]	-0.00133 (-3.15) [0.033]	-0.0024 (-3.88) [0.000]
RGDPG	-0.0315 (-1.44) [0.152]	-0.0357 (-1.56) [0.121]	-0.0338 (-1.90) [0.052]	-0.0205 (-2.27) [0.027]	-0.0974 (-6.84) [0.000]	-0.1217 (-4.97) [0.000]	-0.1118 (-7.79) [0.000]	-0.1057 (-6.17) [0.000]
INFR	0.0614 (2.15) [0.034]	0.0584 (2.20) [0.030]	0.1190 (0.843) [0.401]	0.0321 (2.59) [0.011]	0.0196 (0.560) [0.576]	0.0148 (0.511) [0.610]	0.0279 (0.998) [0.320]	0.0149 (0.351) [0.727]
RINT	-0.0204 (-1.15) [0.254]	-0.0213 (-1.20) [0.234]	-0.0163 (-1.82) [0.074]	-0.0133 (-2.36) [0.032]	-0.1312 (-2.98) [0.003]	-0.1482 (-3.38) [0.001]	-0.2807 (-3.86) [0.000]	-0.0790 (-1.60) [0.112]
1st Order Serial Correlation LM (1)	[0.389]	[0.382]	[0.408]	[0.446]	[0.187]	[0.098]	[0.0203]	[0.200]
2nd Order Serial Correlation LM (1)	[0.321]	[0.309]	[0.311]	[0.328]	[0.303]	[0.323]	[0.272]	[0.295]
Joint Test of Significance	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Sargan Test	[0.248]	[0.489]	[0.619]	[0.548]	[0.000]	[0.000]	[0.047]	[0.040]

Numbers in Parentheses are t-values and numbers in Brackets are p-values. This table reports the GMM-SYSTEM regression, estimated by using DPD99 package for Ox. LEVB is the financial leverage (total debt divided by equity book value). LEVM is the financial leverage (total debt divided by equity market value). MCR is the stock market capitalisation ratio. VTR is the stock market value traded ratio. TOR is the stock market turnover ratio. VOL is the stock market volatility. BCR is the ratio of banking sector credit to private sector to GDP. AT is the asset tangibility (the sum of fixed assets and inventories to total asset). SIZE is the logarithm of total assets. GROWTH measures the growth opportunities and is equal to (total assets-equity book value + year end stock price number of shares outstanding)/ (total assets). PROF is the profitability (operating income before interest, taxes to total asset). VPROF is profit volatility (the absolute value of the first difference of percentage change of operating income). PER is the price-earning ratio. RGDPG measures economic growth (real GDP growth). INFR is the inflation rate. RINT is the real interest rate (measures cost of debt).

The results also show that leverage is negatively and significantly related to the firm size variable, the natural log of total assets. This result is inconsistent with most previous empirical studies which find a positive relationship between firm size and leverage[35]. The possible explanation of our result can be found in Rajan and Zingales (1995), who point out that, "*...information symmetries between insiders in a firm and the capital markets are lower for large firms. So large firms should be more capable of issuing informationally sensitive securities like equity, and should have lower debt*" (p. 1450)[36]. This result can be also explained by reference to the fact that the larger Jordanian firms have a higher average age and thus have a longer and better reputations than the smaller firms, which enable them to access to the stock market at lower cost; the smaller Jordanian firms, on the other hand, have a lower average age which reduce their ability to access the stock market for long-term funds. Another explanation of this result is also related to the fact that the small firms in Jordan are closely held and managed by majority- often family- interest, which may be expected to make them more reluctant to issue equity for fear of losing control of the firm.

The growth opportunity, measured by market-to-book ratios, is significantly and negatively related to leverage as predicted by the theory and as has been found in previous empirical studies that growing firms to be financed by equity.

The variable profits over total assets which measure the firm's profitability enter in most regressions negatively and significantly related to both measures of leverage. The significance of this variable may be related to the high information asymmetry problems of the Jordanian banks- due to the economic instability during the most period under consideration- and to the undeveloped nature of its bond market. It is also that profitability is correlated with growth opportunities so that the negative correlation between profitability and leverage is a proxy for the difficulty in borrowing against intangible growth opportunities.

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[35] Consistent with our results, however, Rajan and Zengales (1995) and Chen and Sterken (1998) in the cases of Germany and the Netherlands, have found some evidence of the positive relationship between firm size and leverage. In addition, our results are consistent with the findings of Singh and Hamid (1992) and Singh (1995) in which small-and medium size firms in developing countries rely primarily on bank loans, while large firms rely primarily on equity. However, our results are inconsistent with Helwegge and Liang's (1996) findings in which they present evidence that small firms frequently issue outside equity before they issue debt.

[36] This also noted by Paranque (2000).

In all regressions leverage is negatively and highly significantly related to the price-earnings ratio. In addition, the real interest rate in most regressions is negatively and significantly related to leverage. These are new results: they have not been tested before in the literature. High price-earnings ratios and high interest rates will cause firms to choose equity over debt, as both of these factors reduce the cost of equity finance.

It is puzzling that the results in Tables (8.3) and (8.4) show that in most regressions the coefficients of the macroeconomic variables *i.e.* the growth rate of real GDP and inflation rates, are insignificant. The insignificance of the inflation variable suggests that general good price inflation has played little independent part in the trend towards higher leverage. This may be because creditors are able to compensate themselves for the wealth transfer to debt holders created by inflation by means of increases in nominal interest rates. The issue is confused, however, by the fact that periods of highest inflation coincided with the presence of financial controls which limited the ability of firms to respond with increased leverage. The insignificance of the growth rate of real GDP also suggests the unimportant role of economic growth in determining the capital decisions of Jordanian firms. This result is inconsistent with Zwiebel's (1996) view that " *leverage should decrease when the market is booming (presuming that this is an indication of good investment opportunities) and should increase when the market is weak*" (p.1211). One explanation of this result is the slowdown of economic activity vis-à-vis reduced investment opportunity for a wide cross-section of firms. As a result of a slowdown, firms are likely to reduce their use of both equity and debt funds.

We turn now to the issue of primary interest, the effect of financial market development on a firm's financial choice. As can be seen from Tables (8.3) and (8.4), the banking sector development indicator is positively and highly significantly related to the leverage. Thus, firms will rely more heavily on debt as the banking sector becomes more developed. This result is highly consistent with our a priori expectations and with the findings in Demirguc-Kunt and Maksimovic (1996).

In both regressions explaining LEVB and LEVM and in the different estimations, the results show that the stock market capitalisation ratio is positively and highly significantly related to a firm's financial choices. When we use alternative specifications of the stock market development indicator- value-traded ratio, turnover ratio and the market price

volitality- we still consistently yield the same pattern, positive and highly significant coefficients for the stock market development indicators. These results are perhaps surprising but they are consistent with the finding in Demirguc-Kunt and Maksimovic (1996). They are surprising because one would expect that as the stock market develops, firms in developing countries would rely more heavily on equity finance as the market imperfections are removed, as indeed firms in developed countries have been shown to do.

The question now is why would firms increase debt issues as the stock market becomes more developed? The first point to make is that firms are not necessarily substituting debt for equity- the evidence suggests that, in fact, firms are increasing the amount of debt relative to equity. But the question remains, why more debt? It is possible that further development of the stock market leads to opportunities for risk sharing and aggregation of information that allows firms to increase borrowing. This, however, assumes that firms were credit-constrained before the stock market became more developed. It is possible also that further development of the stock market improves its takeover function, which might force managers to increase leverage as part of their defence strategies against the increased probability that their firms will be taken over in the future. Another possible explanation of this result might be that the cost of equity issue is typically higher than debt issue in Jordan due to the lack of competition among investment banks.

A more compelling conclusion for the above result however, is that debt and equity finance are not necessarily substitutes for each other, but are possibly financial tools that play significantly different roles in the financing decision. The development of the stock market allows for more risk sharing and information dissemination, which encourages creditors to increase their borrowing. Therefore, the development of the stock market increases equity and debt financing opportunities for firms.

8.7 Summary and Conclusion

In this chapter we have examined the effect of financial market development on the capital structure choices of Jordanian firms during the period 1988-98. While other researchers have examined this issue, this is the first study which looks strictly at an individual country's experience. In addition, the previous study has analysed single cross-country regressions, which suffer from measurement, statistical, and conceptual problems. This

method loses information that could be country-specific, firm specific, and/or time-specific. In this chapter we examined how individual firms make financing choices using a panel data methodology. In addition, as in Chapter VII, our analysis was carried out with the GMM for panel data utilising instruments variables. Particularly, we used two GMM dynamic panel estimators: GMM-Difference and GMM-System estimators.

Furthermore, unlike most previous capital structure studies which study the determinants of capital structure using a non-dynamic model, we employed a dynamic adjustment model. This model allowed us to shed light on the nature of dynamic capital structure adjustment by firms *i.e.* if firms do indeed move towards target leverage ratios or away from them, and the speed with which they do that.

Our results suggest that Jordanian firms typically have capital structures that are not at the target. Regarding the speed of adjustment, the results, however, did not provide us with a clear picture of the speed with which Jordanian firms move towards the target ratios. We find that growth opportunities display a negative relationship with respect to debt-equity ratios. This evidence is consistent with Myers's (1977) views that growing firms are financed by equity. We also find support for the pecking order hypothesis that there are negative relationships between firms' profitability and leverage ratios. This implies that firms prefer to finance investments with internally returned funds before issuing debt.

As for size effect, evidence is presented to indicate that the larger firms employ more equity in their capital structures. Theories suggest that this is due to substantial market imperfections *i.e.* asymmetric information, large firms should be more capable of issuing equity, and should have lower debt. The evidence suggests that the equity-debt ratios are negatively related to price-earnings ratios and the real interest rate. These results indicate that high price-earnings ratios and high interest rates will cause firms to choose equity over debt, as both of these factors reduce the cost of equity finance. However, the results suggest an unimportant role for economic growth and inflation rates in explaining the variation in debt-equity ratios.

Our main results from this chapter have shown that, with further development in the stock market, Jordanian firms become more leveraged. This result suggests that, as the stock market becomes more developed, and as firms have more access to equity, they will not

necessarily issue more equity. In fact, they would issue more debt relative to equity, which implies that transaction costs for equity are high relative to debt, firms are credit constrained or that the issue cost of equity is high due lack of competition among investment banks.

It is also possible that improved information dissemination, monitoring and risk sharing, make firms better credit risks for bank loans. In addition, these results support the findings of the previous empirical chapters that debt and equity are complementary tools of finance, each providing different benefits to firms. Therefore, the development of the stock market increases equity and debt finance opportunities for firms.

The policy implications of this chapter further emphasise the fact that the Jordanian government should not necessarily abandon the development of one component of the financial sector. Since debt and equity are complementary financing tools, each playing a different role, the sectors should be developed together.

Chapter IX
Summary Results and Policy Implications

9.1 Major Results of the Study

This study provides considerable knowledge about the impact of stock market development and economic growth in the small developing country of Jordan. Some of this knowledge might appropriately be generalised to other developing countries that have a similar economic structure. The detailed findings are numerous and discussed throughout the thesis; the following points, however, capture the major results.

(1) Our survey of Jordan's economy and the development of its stock market (Chapter II and III) suggest that:

a. The real economic development has been impressive especially during the 1970s and the first half of the 1980s. The Jordanian economy realised an impressive rate of GDP growth and managed to transform the social, health, public utilities, infrastructure support (transportation and communications) and, especially, educational services from a rudimentary stage to one favourably comparable with the Middle-Eastern countries. Thus, we can conclude that Jordan, during these periods, has achieved both economic growth and development.

b. However, the relatively small size of the economy and its limited natural resources had forced Jordan to develop strong external economic and financial relations to cover its economic development need. The level of economic activities in Jordan tends to be greatly affected by these relations. Important implications of these relations are foreign trade with neighbouring Arab markets, foreign financial assistance (aid and grants), and remittances from Jordanian expatriates, particularly from the Arab oil exporting countries. The anomaly of this dependence on external relations has been the vulnerability of the economy to exogenous factors beyond the control of the economy itself. In addition to this

peculiar set up, the economy itself is characterised by the following: first, structural problems indicated by a low degree of complementarily among the various sectors, and extensive dependence on foreign markets for imports and exports; second, serious discrepancies between investment and national savings, leading to a significant dependence on external sources, mainly aid, grants, remittances from Jordanian expatriates and debt to financing investment; third, chronic imbalance between budget revenues and expenditures, and the existence of a long-standing budget deficit; finally, imbalance between population density and employment, resulting in structural distortion in the employment market.

c. Faced with increasing economic difficulties at the end of the 1980s and the beginning of the1990s, Jordan embarked on wide-ranging structural reform programs. As a consequence, over the last few years, Jordan has made significant progress towards liberalisation of its trade, exchange rate and interest rate regimes and, to a lesser extent, moving toward achieving greater integration into the international financial system. In particular, Jordan has made progress in eliminating import and exchange and interest rate restrictions, lowering import tariffs, and adopting current account convertibility. In recent years, liberalisation of inward capital movements has been pursued in Jordan, together with a gradual relaxation of controls on outward capital flows.

d. However, more than any other country in the region, Jordan's future performance depends on the progress in the political stability in the Middle East. Its major three sources of revenues: tourism, remittances and regional trade as well as foreign direct investments are vulnerable to political setbacks. Political stability in the region and removal of the UN embargo on Iraq will inspire confidence in the Jordanian economy. The government also needs to continue with the policies of economic restructuring, privatisation and liberalisation, and to put in place key legislation governing investment and taxation in order to stimulate the local and foreign investment needed to accelerate the economic growth.

e. Financial sector in Jordan is relatively well developed. This fact has also been documented by many World Bank studies. More specifically, these studies have classified Jordan within the countries that having developed financial sector. In fact, the Jordan financial system has witnessed extensive development both quantitatively and qualitatively

during the last two decades. Total assets of licensed banks as a percentage of GDP increased from 81.7 percent in 1978 to over 200 percent at the end of 1998. The banking system played an effective role in intermediating short-term savings and medium-term financing requirements. Total outstanding credit facilities of licensed banks increased from 42.6 percent in 1978 to more than 81 percent in 1998, reflecting a deepening of private sector financing. This quantitative growth was accompanied by increasing modernization and sophistication in terms of the day-to-day banking business. Although Jordan's banking sector has witnessed extensive development, it still suffers from segmentation, with relatively little competition and little participation of foreign banks. It is worth noting that the Government has already embarked on a programme of addressing this segmentation in the banking sector.

f. The evolution of the AFM is discussed in Chapter III. It was clear from the chapter that the AFM has evolved at a very fast pace since its establishment in 1978. The AFM represents one of the most developed and organised markets in the region as well as many other emerging markets with a high capitalising to GDP, low level of volatility, low transaction costs, relatively high quality of regulation, availability of information and visibility that is superior to other Middle Eastern as well as many emerging markets. In fact the AFM today ranks among the leaders of emerging markets.

g. The AFM has served the Jordanian economy for almost twenty years and contributed greatly to the establishment of the financial foundation for the development of the natural resources of the country in the early 1980s. One reason behind this success is the strong local demand for stocks in addition to demand generated by Jordanian expatriates and citizens from oil-rich countries. In addition, local companies have started to realise the financial benefits of raising funds in the stock market as opposed to the traditional bank lending. The value of the primary capital issues has been steadily rising which indicates that companies are increasingly turning to the stock market as a means of raising funds. With over 20 percent of gross capital formulation that has been financed by primary equity issues on average during the period 1978-98, Jordan represents one of the top three countries in emerging economies according to the important role of equity issues in financing investments.

h. However, compared with some emerging markets as well as the developed markets, the AFM is a relatively low liquid market. The relatively low liquidity of the AFM can be attributed to the following reasons: (i) the current method of trading on the exchange in which there are no markets makers which tends to limit the size of trades that can be executed, (ii) the substantial government's share portfolio, and a significant part of which is not traded, and (iii) the lack of any but a few undeveloped institutional investors (pension funds, insurance companies and mutual funds).

i. Recently, as part of the economic reform program, the AFM has taken a number of initiatives to achieve higher levels of excellence as it addresses the issues of trading capacity, liquidity, and fairness, and how to improve the technological, regulatory, and inter market capabilities of the major securities markets across the Arab World, through substantial investment in technology and facilities.

j. Jordan's bond market is still in an early stage of development. Major factors inhibiting the growth of the bond market in Jordan are as follows: (i) the lack of an institutional and legal infrastructure (ii) the bulk of the bonds outstanding are in the hands of financial institutions, mainly banks, following a buy and hold strategy, and (iii) the lack of market makers.

(2) The literature on the stock market-growth nexus was reviewed in Chapter IV. In short, we can summarises the main conclusions of this chapter as follows:

a. The role and the impact of stock markets on economic growth process have not received as much attention as other elements of financial sector in theoretical literature. Historically, the most theoretical studies have focused on banks. Recently, more attentions have been given to the role of stock markets on economic growth process. However, all these studies concentrate on specific aspects of stock markets and their impact on real activity. None of these studies have provided a comprehensive framework of the different effects of stock markets and at empirically testable relationships.

b. The existing theoretical literature has identified various mechanisms to explain the positive incidence of stock markets on long-run economic growth rate. The mechanisms emphasised by these studies rely on the premise that stock markets help to promote

physical capital accumulation, improve capital mobilising and increase total factor productivity growth. Theoretical analysis in these studies show that stock markets can do this by performing different financial functions: decrease liquidity and productivity risks, facilitating liquidity, information production, exerting corporate control and monitor, improving capital mobilising to their efficient use and transmission path for monetary policy.

c. Numerous economists, however, tend to argue that since stock markets do not raise much capital, they are insignificant in the development process. Stock markets may even have a negative effect since they are merely "*Casinos*". Moreover, because most stock markets in developing countries are very thin, some researchers argue that this may lead to excessive volatility in share prices. Stock price volatility may seriously hamper economic development. In addition, other researchers argue that because stock markets have many more problems with asymmetric information, and since banks and other financial intermediates perform similar functions, they are more suitable than stock markets for developing countries.

(3) The first empirical analysis of the relationship between stock market development and macroeconomic growth was presented in Chapter V. The evidence presented in this chapter challenged some economists' belief that stock market development is not important in the growth process of countries, especially for developing countries, since other financial intermediaries can provide the same financial services. The empirical results suggest the existence of a strong positive relationship between the stock market development and economic growth in Jordan. This result has an important implication; it provides a high degree of confidence that the development of stock market is an effective policy towards promoting the Jordanian economic growth. We tested the relation between the stock market development and economic growth by using different specifications of an empirical model extended from a simple endogenous growth theory, where the stock market is assumed to effect economic growth through increasing capital accumulation, mobilising capital to its efficient use and improving total factor productivity growth in an economy. To control the endogenous determination of stock market development (a subset of the stock market development may not be exogenous), all regressions were run with TSLS technique. In short, we can summarise the findings of this chapter as follows:

a. The findings from estimation of the basic regression, which consisted of the per capita real GDP growth as the dependent variable and the labour, capital, and stock market development as the independent variables, showing that the stock market capitalisation is statistically significant correlated with per capita real GDP growth. A one-percentage point increase in the market capitalisation is associated with (0.242) percentage increase in per capita real GDP growth. This result is highly consistent with the theoretical view that the ability of the stock market to mobilise capital and sharing risk is intimately associated with economic growth. This appreciated result, however, is inconsistent with the previous studies which failed to find a relationship between stock markets capitalisation and economic growth.

b. When we added the banking sector development indicator, measured as the total assets of the banking sector divided by GDP, to the basic model and re-run the regression we found that the stock market capitalisation coefficient remained positively and statistically significant correlated with per capita real GDP growth, whereas the banking sector development variable inters positively but insignificant. To further reinforce the above result, we were re-run the above regression, but this time we added three additional regressors to account for the contribution of other factors known to influence growth of per capita real GDP: inflation rate and the ratio of government expenditure to GDP as indicators of macroeconomic stability and the sum of export and import as share of GDP as indicator of the openness of economy. The results obtained show that, even after taking into account the role of these factors, the banking sector development indicator remained insignificant and the stock market capitalisation also still significantly contributes to real economic growth.

c. After replacing the total assets of the banking sector/GDP with another alternative indicator of banking sector development *i.e.,* the total value of private credits from the banking sector divided by GDP, we found that stock market capitalisation continues to remain positively and significantly correlated with per capita real GDP growth. In addition, the alternative indicator of banking sector development becomes positively and statistically significant correlated with growth. This result was also robust to the inclusion of other factors known to influence economic growth. This result has an important implication; it validates the argument that stock market development performs a different set of functions not entirely provided by banks. While there are direct benefits of stock markets

development to the growth process through challenging of funds to their most optimal use, hedging risk, increasing liquidity and exerting corporate governance, the indirect effects of stock market development are equally important. Stock markets promote regular publication of financial statements of listed companies, standardising of accounting practices, better investor protection law, and establishment of a regulatory agency, all of which have important growth effects not fully provided by the banking system. Banks on the other hand, are no less important and are the primary saving institutions that engage in deposit gathering, safekeeping, providing liquidity, and providing capital mobilising services. The empirical finding above has important policy implications; it emphasise that the Jordanian government should not necessarily abandon the development of one component of the financial sector. Because the stock market and the banking sector are playing complementary roles in promoting economic growth, the sectors should be developed together.

d. When we used other proxies of stock market development that may capture another function of the stock market, the results obtained yield relatively similar conclusions to those mentioned above. Each stock market liquidity indicator used *i.e.,* turnover, value traded, turnover/volatility, and traded/volatility ratio, and the value of private credits from the banking sector divided by GDP appeared to exert a significant and positive influence on per capita real GDP growth. Besides being statistically significant the estimated coefficients suggest that the relation between the stock market liquidity and growth is economically large. These results have important implications from the theoretical point of view. First, increased market liquidity allows agents to avoid both liquidity and productivity risk, thereby encouraging investment in the long-run, facilitating technological innovation and enhancing the long-run growth. Second, greater liquidity has a direct impact on the effectiveness of the governance and information functions of the stock market and therefore upon firms' economic efficiency. Increased market activity induces information acquisition, which in turn increases the information content of share prices which enable firms to make better investment decisions. The effective use of the stock market for corporate control activities also requires that the market be liquid. Takeovers require a liquid capital market where bidders access a vast amount of capital on short notice. Finally, increased stock market liquidity can reduce the cost of equity capital

through reducing the expected return that investors require investing in equity to compensate them for the risks *i.e.*, risk premium.

e. Our results also suggested that the "*price-effect*", a change in the value traded and market capitalisation ratio due purely to in a change in stock price, were not driving the findings of the strong link between the stock market liquidity and economic growth. This conclusion was derived from two results. First, both the value-traded and turnover ratios are significantly correlated with economic growth. This implies that increases in the stock prices are not driving the liquidity results and this price effect does not influence the turnover ratio. Second, the market capitalisation and value-traded ratios were simultaneously included in the regression growth; both remained significantly correlated with the economic growth, with little change in the estimated coefficients. This further implies that changes in the stock prices were not driving the results on the value-traded, since both the market capitalisation and value-traded ratios are influenced by the price changes. If the price effects were driving the value-traded results, then both indicators would not enter significantly correlated with growth.

f. Consistent with the previous cross-country studies, the coefficient on the market volatility indicator was found to be negatively but not statistically significant.

g. Over all, the empirical results in this chapter yet confirmed the significance of the stock market in the development process of the small developing country of Jordan. This knowledge might appropriately be generalised to other developing economies that have a similar economic structure. Thus, the developing countries that have similar economic structure to Jordan would be well advised to develop of their stock markets in order to mobilise a greater amount of national savings. This also would, inter alia, improve the investment, raise the efficiency of investments, increase output and consequently improve the prospects of growth and development.

(4) While the analysis in Chapter V was offered comprehensive evidence on the strength of the relation between the stock market development and economic growth, its findings merely suggest that there is an exogenous component of the stock market development that positively influences per capita real GDP growth. Thus, one fundamental question was unanswered in Chapter V. Is the stock market a leading sector in the economy? Or is there

any feedback consequence effect of the growth? Using Grander-causality tests within a framework based on unit root and cointegration tests, Chapter VI was devoted to answering this question. The cointegration tests used were based on both the Engle-Granger (1987) two-step procedure and Johansen (1988, 1991) maximum-likelihood method. While the results from this chapter largely support the view that there is a stable, long run equilibrium relationship between the evolution of the stock market development and the evolution of per capita real GDP growth, they provide no support to the view that the stock market is a leading sector in the process of Jordan's economic development. Most of the results presented in this chapter support the view that the relation between the stock market development and economic growth in Jordan is bi-directional. The policy implication of the present chapter is clear by now. The reforms that contribute to the process of economic development may also contribute to the process of the stock market.

In short, we can summarise the results of Chapter VI as follows:

a. Both the Argument Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests were used to investigate the stationarity statutes of each variable. The results from both tests were highly consistent, suggesting that all stock market development variables and economic growth variable are integrated of order one.

b. Given that the variables of interest are I(1), we next examined the possibility that per capita real GDP growth and each of the stock market development indicators: market capitalisation, value traded, turnover, traded/volatility, turnover/volatility ratio and market volatility, exhibit a common stochastic trend. In other words, given that all the variables of interest are integrated of order one, we might use cointegration methodology to test for the existence of a stable long-run relationship between the level of per capita real GDP growth and the state of development of the stock market indicators. The inference was based on both the Engle-Granger and Johansen approaches. Both test results suggested that per capita real GDP growth and each of the stock market development indicators (except market volatility, which yielded conflict results; the Engel-Granger test failed to detect cointegration) are cointegrated. These results have an important implication: it implies that there is a stable, long-run equilibrium relationship between the evolution of the stock market development and the evolution of per capita real GDP. In each short-run period per

capita real GDP and each of these variables of stock market development are adjusting to their long-run equilibrium relationship.

c. Given the results from the cointegration tests, we conducted VECM based Granger-causality tests using the Engle-Granger and/or Johansen cointegration vectors, for the pairs of variables for which of the two procedures showed evidence of cointegration, otherwise the causality tests were conducted using first-differenced VARs. Remarkably, the results obtained from the Engel-Granger approach were broadly consistent with those obtained from Johansen approach (except the market volatility, which yielded confused results); the data provided no evidence to support the view that the stock market is a leading sector in the process of Jordan's economic growth. On the other hand, most of the evidence suggested that the stock market development and economic growth exhibit bi-directional causality. Thus, the two-way relationship between the stock market development and economic growth in Jordan suggests that not only does the stock market development influence growth but also there are feedback effects from greater output to an increased demand for the stock market development. This result is highly consistent with the view of a number of endogenous growth models, which predict two-way causality between financial development and economic growth.

(5) In Chapter VII we provided micro-level tests for the relationship between stock market development and economic growth in Jordan. Particularly, using firm level data for 56 industrial firms during the period 1988-98 we examined the causal relationship between stock market development and firms' real economic performance. Focusing on the mobilising capital, information production and governance roles of stock markets, we constructed a simple dynamic firm growth empirical model in which stock markets developments affect firm growth mainly through enhancing productivity growth within the firm. Using this model we investigated three related issues. Firstly, whether the firms that heavily depend on equity finance grow faster with the higher level of the stock market development than firms that are not heavily dependent on equity finance. Secondly, whether the stock market is a substitute or a complement for the banking sector in providing financial services to the corporate sector in Jordan. Thirdly, whether the performance of large and small firms in terms of growth react differently to the stock market and banking sector development.

Using the GMM dynamic panel technique with both a difference and a system estimator which enables consistent estimation in spite of heteroscedasticity and autocorrelation, we found evidence consistent with our hypothesis and confirmed our conclusions from macro–level tests in previous empirical chapters in that the development of the stock market has a significant effect on Jordan's economic growth. In short, we can summaries the findings of Chapter VII as follows:

a. The evidence suggested that the level of liquidity, size, and volatility of the stock market exerts a statistically significant and economically large impact on the firm's growth. Particularly, we found evidence which indicated that with more development in the stock market, firms that use equity finance heavily grow faster than firms' that do not. This key empirical evidence was robust to changes in the method of estimation. This favourable result is consistent with our view that more development in the stock market which is associated with improvement in capital mobilising, information production, and monitor and control functions, provides net value added to the firms through improvements in their efficiency and productivity. Thus, in this chapter we provided a firm-level support for the proposition that the development of the stock market facilitates economic growth in Jordan, advanced by the previous empirical chapters (Chapter V and VI).

b. The evidence also showed that both the stock market and banking sector development are important in facilitating the firms' growth in Jordan. Particularly, we found that measures of both market and banking sector development independently predict firms' growth when entered in firm growth regression. Beside emphasising the strong link between financial development and economic growth at firm-level, this evidence highly confirmed our conclusion in Chapter V in that the stock market and banks in Jordan are complementary rather than substitutes in providing financial services to the corporate sector.

c. Consistent with our hypothesis that the stock market and the banks have different effects on small and large firms, we found evidence suggests that large firms' performance in term of value added growth is more sensitive to the stock market development while small firms performance is more sensitive to variations in the banking sector development. One interpretation of this result is that information symmetries between insiders in a firm and the stock market are lower for large firms. Therefore, large firms are likely to be more

dependent on equity finance and less dependent on debt finance. Thus, changes in stock market development are likely to have more significant influence on a large firm's growth than on the growth of a smaller one.

(6) Given that firms in developing countries make different corporate financing choices than their developed country counterparts largely due to differences in market conditions, this study also investigated the effect of these conditions on the corporate capital structure made by Jordanian firms. Chapter VIII investigated how the stock market development affects the ability of Jordanian firms to raise capital for new growth and how this change affects the capital structure choices that these firms make. The main results presented in this chapter suggest that as the stock market develops, Jordanian firms will be likely to issue more debt than equity. Particularly, we found that the stock market development is positively and significantly effect correlated with leverage ratios. The implication of this result is that debt and equity are not necessarily substitutes for each other. As the stock market becomes more developed and as firms have more access to equity, they will not necessarily issue more equity. In fact, they would issue more debt relative to equity, which implies that capital costs for equity were high relative to debt, firms were credit constrained or that the issue of equity was high due to lack of competition among investments banks. It is also possible that the stock market development leads to opportunities for risk sharing and information dissemination and monitoring that allow firms to increase their borrowing. In addition, this result provides support for the argument that debt and equity are complementary tools of finance, each providing different benefits to the firms. Therefore, the development of the stock market increases the equity and debt financing opportunities for firms.

In sum, our empirical implication from this chapter is that debt and equity are not necessary substitute financial instruments because stock market and financial intermediaries play complementary roles in the economy, so that government policies to develop the stock market need not distinguish the importance of the banking sector. This investigation also has important implication for the developing countries: it suggests that the stock market can play an important role even where the economy has a banking sector which is already well developed.

9.2 Policy Implications

The analysis and empirical findings of this study have important implications for the conduct of economic policy regarding the role of the stock market in Jordan's economy. There is reasonable confidence that development of the stock market is an effective policy towards promoting Jordan's economic growth. By adopting measures in favour of stock market development, the Jordanian government might be successful in establishing a strategy that enhances the role of the stock market in the process of economic development. In this respect, given the past and actual performance of the stock market in Jordan, considerable progress has been made towards improving the regulatory framework, which is expected to enhance the role of the stock market in the economy. Yet, there still remains standing critical issues that represent a challenge but which are necessary for promoting the activities of the stock market in a competitive global environment.

It was clear from the analysis that, from a macroeconomic perspective, the key factors determining the future development of the stock market in Jordan and its relation with international capital markets are the domestic macroeconomic policy stance and the status of external financial relation. These will remain the key issues in influencing investors' perceptions of transfer risk. To this end, the government needs to continue with the policies of economic restructuring, privatisation and liberalisation, and put in place key legislation governing investment and taxation in order to stimulate local and foreign investment.

Equity flows to Jordan will also be influenced by political stability in the region. Specifically, foreign capital inflows may be expected to respond positively to the achievement of a comprehensive, just and durable peace in the region. A comprehensive and just peace would impact on the country specific risk through the issuing reduction in the region risk component.

In addition, Jordan needs a set of policies aimed specifically at enhancing demand and supply of equities. The Government might be recognizing the role of the stock market in the privatisation process. As illustrated by the experience of Latin America countries, the successful implementation of privatisation programs may be viewed as having a two-way causal relation with stock market development. Carrying out privatisation process through local stock exchange may produce significant direct and indirect benefits for local stock

market development. Privatisation sales through public offerings lead to significant increases in market capitalisation. Listings of large privatised companies also provide a substantial impact on trading liquidity on the local stock market while at the same time increasing the investment opportunities for local investors to increase their portfolio diversification. These effects have a positive impact on the risk-sharing function of the market and lead to market deepening. Thus, privatisation through the stock market may solve the low *listing trap* by adding diversification possibilities, which in turn encourages both investment and listing by private firms. New listing due to privatisation sales reduces the non-systematic risk of a local equity portfolio, and increases the willingness to invest in stocks, leading to higher liquidity.

Jordan's banks have an important role to play in the development of the stock market. The importance of banks in enhancing the development of the stock market comes mainly from their role as intermediaries between the business sector and the investors. Both of them need specialised institutions to help them plan the start-up companies, and assist them raise the required capital. What Jordan needs most are investment banks that can provide strong financial analysis, underwriting of share issues at their own risk, floating of the shares to the public at large and making markets for these issues. Aside from the commission, income generated from buying and selling securities for clients, banks can establish their own trading portfolios utilising the market intelligence gained through active trading for customers. They could also provide portfolio management services for those clients who do not have the time or knowledge to manage their own investments in the stock market. Banks can also participate in venture capital business to help turn new ideas into productive concerns and provide equity capital to small enterprises.

Investment banking activities might be developed either from within the existing commercial banking system or through the existing commercial banks or through the establishment of new institutions that would be able to provide brokerage services, portfolio and fund management, trading and underwriting of securities. Serious consideration should also be given to the role of banks as market makers, allowing them to take positions and create markets by buying and selling shares. This will undoubtedly give added depth to the market and enhance the transparency of share trading in the market.

In addition, Jordan needs to develop and promote the creation of specialised financial institutions: pension funds, insurance companies and mutual funds. These institutions can play a very important role in the development of the stock market. These institutions can play a potential role in increases depth and liquidity in the stock market. These institutions can play important role in the modernisation of the stock market, the development of an efficient trading and settlement system, the adoption modern accounting and auditing standards, enhance transparency and information disclosure and strengthen corporate governance.

The development of specialised financial institutions can increase the demand for shares and the level of professional fund management, hence, they can increase market capitalisation, and the value traded both relative to GDP. This can be explained because, for a given stock of assets, a development specialised financial institutions increase the institutional demand for shares. In addition, since these institutions are illiquid assets in wealth-holder's portfolios, their development can promote agents to rebalance their portfolios in order to restore desired levels of liquidity. Thus, asset-holders reduce holding of illiquid assets they control (*e.g.,* real state and non-traded financial instruments) in favour of liquid assets such as cash, bonds and shares.

The development of specialised financial institutions can also be beneficial to product innovation in the capital market by stimulating the use of hedging strategies and derivatives. In addition, the development of specialised financial institutions can create opportunities for the modernisation of the stock market, the development of efficient trading and settlement systems, the adoption of modern accounting, auditing and disclosure standards, including the promotion of quality information, and improvement in market infrastructure.

Furthermore, the development of specialised financial institutions can promote improvement in the stock market regulation, especially regarding protection of minority shareholders rights, protection against insider information, and conflict of interest. Finally, the development of these institutions can improve corporate governance. These institutions monitor the companies they invest in and press for improved governance, when appropriate, to ensure that investments produce the highest possible returns.

It is also important to stress the need for the simultaneous strengthening of the banking market. Indeed, a sound and competitive banking sector plays an important role in fostering the development of an efficient capital market. Hence, policy efforts to develop the stock market should not come at the expense of the strengthening of the banking sector. Interestingly, several of measures required for the latter, especially those affecting the competition environment.

In conclusion, the success of Jordan in strengthening the role of its stock market in economic growth and development efforts is likely to depend on three key factors: first, success in reducing perceptions of the country-specific risk through the continuous sustained implementation of adjustment and reform economic policies; secondly, recognising the stock market in the implementation of the privatisation program; thirdly, the ability of authority to address institutional inhibiting of the stock market deepening and more generally, the balance development of financial markets through promote establishing specialised and contractual financial institutions.

9.3 Limitations

This study is not without its limitations which might have affected the empirical results. Clearly, reliable data is an issue in any study of developing countries. In addition, the most important limitation aspect is the availability of data. The small sample used in the macro analysis is annual time series data covering merely the period 1978-98 which may not be long enough and so is likely affect the robustness of empirical results.

More important is that the stock market indicators we used in our empirical analysis may not be the appreciate measures for the stock market development. As we have shown before, stock markets can influence economic growth by performing different functions. They aggregate and mobilise capital, enhance liquidity, provide risk pooling and sharing, assess and select projects and management through producing information, and monitoring managers. It is quite difficult, however, to construct direct measures of these functions and also perfect measures certainly do not exist. Therefore, using proxies may not accurately reflect how stock markets carried out these functions.

9.4 Future Research

While this study makes important contributions to the growing empirical literature in this field, much still needs to be done. Some possible future extensions of this study could be:

1. Future research could expand the analysis of this study to study other countries, extend the sample period and examine the effects of other financial intermediaries such as the insurance market and the market for other financial intermediaries.

2. While this study provides comprehensive empirical tests at macro- and micro-levels of the relation between stock market development and real economic performance, it does not explore the channels through which the stock market affects growth. Therefore, more research in this area is needed. At macro-level, future research could assess the effect of stock market development on capital accumulation, private savings rates and productivity growth. At micro-level, future research could investigate the causal relationship between stock market development and firms' investment rates, technical changes and economic efficiency.

3. In this study we do not consider the effect of the stock market liberalisation. By raising the demand for shares on the stock market, opening the stock market to foreign investment lower the cost of capital for local firms and adds their incentives for going public, which in turn makes market more liquid and efficient. This in turn increases local investors' opportunities for portfolio diversification which raises their motivation to invest in shares. Open market for foreigners also increases the liquidity which has an indirect impact on the monitoring and control functions of stock markets. With greater liquidity, the market become more efficient in that it better reflects information about firms. This makes the firms' stock prices more informative and hence more useful in monitoring management investment decisions. Therefore, we should expect that a more international-integrated stock market have a strong effect on economic growth. This topic is not extensively investigated.

4. Finally, the results of this study should promote a study of the implication of developing stock markets in developing countries. If the stock market can be shown to influence economic development, reforms that promote the development of stock markets

should be encouraged so that a country has the adequate infrastructure to support capital markets. Much additional research however is needed to formalise these results in any theory of economic development. The conclusions derived from country's experience may not be bound to apply to other countries. But it opens up an exciting topic for research.

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