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STRUCTURAL CHANGE, PUBLIC SECTOR GROWTH AND ECONOMIC DEVELOPMENT

by

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Thesis submitted for the degree of Ph.D.:

STRUCTURAL CHANGE, PUBLIC SECTOR GROWTH AND ECONOMIC DEVELOPMENT

NORMAN GEMMELL

Abstract

This thesis examines some aspects of the process of structural change during development. It is concerned particularly with the growth of service sectors, both privately- and publicly-owned.

Three aspects of structural change towards services are examined. Firstly, it is desired to establish whether there are uniform patterns of structural change for the service sector across countries. Secondly, evidence of substantial social service growth, most of which is publicly-owned and 'non-marketed' (i.e. not sold via the market mechanism) suggests that there may be important macroeconomic consequences for the economies concerned. The thesis extends existing analysis to permit examination of the relationship between non-market sector growth and macroeconomic performance.

Thirdly, when public expenditure rises in association with increases in the non-market sector, increased tax revenue may be required. This thesis therefore provides a model of tax revenue growth during development which identifies automatic and discretionary tax changes.

These three aspects of structural change are then examined in the context of the Egyptian economy since 1960. The pattern of Egypt's structural change is examined and possible explanations are investigated. The effects of growth in Egypt's non-market sector are also examined, and some aspects of tax revenue growth are considered.

Acknowledgements

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STRUCTURAL CHANGE, PUBLIC SECTOR GROWTH AND ECONOMIC DEVELOPMENT

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P A R T 1

INTRODUCTION

C H A P T E R 1

INTRODUCTION AND OUTLINE

Interest in 'structural change' has been fundamental to development economics since the earliest days of the subject. Following the seminal contribution of Lewis (1954) it has become commonplace to assume, when modelling the process of development, that it is appropriate to divide an economy, for analytical purposes, into at least two sectors. These have usually taken the form of a rural/agricultural/traditional sector and an urban/industrial/modern sector, where these two sectors have sufficiently different characteristics to warrant distinguishing between them. Thus, according to Chenery (1979), 'Economic development can be viewed as a set of interrelated changes in the structure of an economy that are required for its continued growth . . . These structural changes define the transformation of a traditional to a modern economic system'. (p. xvi)

So much has been written on the issue of structural change, both theoretical and empirical, that it might be asked whether a further study can contribute to our understanding of the process. Recent evidence from developing countries, however, has suggested that, at least for some purposes, a dual economy model with traditional and modern sectors, may need to be replaced by a three sector model which can account for significant differences between rural and urban 'traditional' sectors. Recent migration models, for example, such as Fields (1975) and Mazumdar (1973) included an urban 'traditional' sector because the observed processes of labour resource transfers were clearly not adequately depicted by shifts from a rural/agricultural labour force to a modern/industrial labour force.

For developed countries, since the work of Fisher (1933, 1939) and Clarke (1940) economic activity has often been divided along structural lines into agricultural, industrial and service sectors

(or primary, secondary and tertiary). The roles of these sectors (whose definitions are considered more closely below) were argued to change with the level of development or per capita income reached. Indeed the recent growth of service sectors in developed countries has generated renewed interest and a great deal of discussion among economists.

The role of service activities in developing countries however remains a subject which has received relatively little research effort. While the growth in urban traditional or 'informal' activities, many of which could be classed as services, has been studied in recent years, the growth of modern services has generally received little attention. This is perhaps most apparent with reference to publicly-provided services which have been examined and analysed at length in developed countries, but remain largely neglected in developing countries. In particular, the causes and consequences of structural change involving public service sectors during the development process have received little attention, most previous work being concerned with specific economies at particular stages in their development.

This thesis aims to fill some of these gaps by examining some aspects of the growth of service activities during development. It was readily apparent at the initial stages of this study that the growth of publicly-provided services is an important component of a more general growth in services experienced by many countries. In many important respects publicly- and privately-provided services differ from each other such that to understand the processes and consequences of service growth overall it is often necessary to examine these two forms of service activity separately. The nature of these differences and their implications for economic analysis will

become clear in subsequent chapters and need not be rehearsed here. However one important difference between private and public services is that while the former are generally provided through the 'market-place', the latter, in general, are not. The processes determining the production of these two services may therefore be expected to differ. In examining structural change during development this thesis will therefore consider the respective roles of private and public services.

The thesis is concerned primarily with three aspects of structural change towards services during development. Firstly, it is desired to establish whether there are uniform patterns of structural change for the service sector across countries. Previous evidence (mainly by Chenery and various associates[1]) has generally supported the existence of uniform patterns across countries for agricultural and industrial sectors, but has offered less support to the view that service sector growth is also similar across countries.

Secondly, evidence of substantial social service growth most of which is publicly-owned and 'non-marketed'(i.e. not sold via the market mechanism) suggests that, following the analysis of Bacon and Eltis (1976), there may be important macroeconomic consequences for the economies concerned. The Bacon and Eltis analysis is therefore extended here to permit examination of the relationship between non-market sector growth and macroeconomic performance.

Thirdly, this thesis proposes a method of analysing the growth of tax revenues during development. When public expenditure increases to provide more non-marketed services, taxation increases may be sought to finance this increased expenditure. It is important therefore to be able to identify the extent to which tax revenue will rise

automatically when incomes increase (often referred to as the 'built-in flexibility' of the tax system) and the consequences of discretionary changes to the tax structure by the tax authorities.

These three aspects of structural change are then considered in the context of the Egyptian economy since 1960. Egypt is a particularly interesting case to examine because, as shown in Part 3, it has experienced substantial growth in service activities, both privately- and publicly-owned. This has been associated with large increases in public expenditure which have generally exceeded increases in tax revenues. In addition the macroeconomic changes associated with the growth in Egypt's non-market services appear to be similar to those identified in the U.K. by Bacon and Eltis.

1.1 OUTLINE OF THE THESIS

The thesis is organised into four parts. In Part 2 the three aspects of structural change towards services discussed in the previous sectionare considered using international evidence and/or 'general' models of the processes being analysed. In Part 3 structural changes in the Egyptian economy are examined in relation to the international evidence, and the models developed and discussed in Part 2 are applied to Egypt. Part 4 summarises the main results in Parts 2 and 3, draws some general conclusions and suggests possible avenues that future research might usefully pursue.

Chapter 2 provides evidence on patterns of structural change during development, examining in particular how cross-section studies can accommodate the recent evidence on 'de-industrialisation' in many developed countries. It is argued that the functional forms of equations previously used to test for patterns of structural change are now

inappropriate, and new functional forms are proposed. Applying these to a sample of 30 developed and developing countries it is found that empirical evidence supports the existence of clear patterns of structural change across developed and developing countries. This is the case for agricultural, industrial and service sectors.

In chapter 3 market and non-market sectors are introduced and the implications for an economy's macroeconomic performance of differing rates of growth of the non-market sector are examined. The chapter then provides a framework within which international comparisons of non-market sector expansion can be made and identifies possible consequences of employment growth in both market and non-market sectors. This analysis is applied to a sample of developed and less developed countries, which suggests that, among developed countries, the adverse effects associated with non-market sector expansion have probably been greatest in the U.K. Similar effects however are evident in several less developed countries, including Syria and Egypt.

Chapters 4 and 5 provide models of tax revenue growth during development. Chapter 4 provides a method of examining the built-in flexibility of various progressive income tax structures. A non-linear tax schedule is used in conjunction with a lognormal distribution of incomes. Schedules of effective average and marginal tax rates, and revenue elasticities are obtained. The model allows the effects of discretionary changes in the tax system at different average income levels to be isolated. The model is also tractable, and is able to capture the main characteristics of actual systems, using few parameters. These properties are useful where the model is to be integrated into a wider fiscal model as in chapter 5.

The tax/transfer model in chapter 5 includes income tax, a social insurance tax, value added tax and a system of income transfers to the low paid. The model identifies the importance for revenue growth

of interdependencies between component taxes/transfers in the model and the extent of indexation of tax thresholds. Effective average tax rate schedules are derived under different indexation assumptions, using a simulated lognormal income distribution.

Of the five chapters in Part 3 on the Egyptian economy, chapters 6, 7 and 8 are concerned with the extent of, and influences on, the structural shift in employment towards services. Chapters 9 and 10 examine the role of the non-market sector and the development of tax revenues in Egypt respectively.

Chapter 6 examines the evidence on structural change in Egypt and highlights the growth in service activities during 1960-75. This is compared to other countries' recent performance using the methodology/ results from chapters 2 and 3 and to Egypt's earlier historical experience. Some of the reasons proposed by economic theory for relative service sector growth are then discussed. These are used in chapter 7 to try to explain the observed relative growth in service employment. Two methodologies are used: (1) a simple regression model to identify the roles of income elasticities and factor prices and (2) a comparison of employment, output and productivity growth rates. The results suggest significant differences in causal factors between services, requiring a more disaggregated analysis in chapter 8.

A detailed study of factors affecting output and productivity growth in various services in chapter 8 allows tentative conclusions on the reasons for Egypt's expansion of service employment over the period. These appear to differ primarily between 'commercial' and 'social' services and between private and public sectors. Factors found to be important are rural-urban migration, government education and employment policies.

Chapter 9 considers some of the consequences of changes in the composition of demand for market sector goods and services. It is shown that increases in the relative size of the non-market sector raise the rate of productivity growth necessary to maintain marketed output growth and avoid inflationary pressures. For the Egyptian economy, during 1960-76, it is argued that an increasing non-market sector is at least partly to blame for the country's worsening balance of payments, low growth and inflationary pressures. Excessive increases in both defence and non-defence public expenditures are identified.

Finally, in Part 3 the growth of Egyptian tax revenues during 1960-78 are examined in chapter 10. After considering how the models developed in chapters 4 and 5 can be adapted/applied to the Egyptian tax system, the flexibility of the Egyptian tax structure is examined in the light of the earlier tax model results. Evidence suggests that although there is considerable built-in flexibility in the income tax, discretionary tax changes have kept income tax revenues growing in line with average incomes. The proportional or regressive structure of most indirect taxes suggest little flexibility for these taxes.

1.2 SOME DEFINITIONS AND METHODOLOGICAL ISSUES

Already in this chapter terms such as 'structural change', 'non-market sector' and 'development', which may have different meanings in different contexts, have been used. They will be used repeatedly in subsequent chapters and it is important that their meaning in the context of this thesis should be established at an early stage.

There is a long tradition within economics that an explanation of the growth of various economic aggregates such as output, employment

and investment, necessitates an understanding of the composition or structure of these aggregates. Adam Smith, for example, found it useful to distinguish between 'productive' and 'unproductive' labour in an explanation of capital accumulation. These terms were associated with different types of employment, the former being involved in producing 'vendable commodities' while the work of the latter 'perishes in the very instant of its production' (Smith (1789, p. 430-1)).[2] Clearly the relevant structure or components will depend on the aggregate under investigation and what factors are thought to constrain or facilitate the growth of that aggregate. In the case of total production and employment it has often been argued that growth may be constrained by the type of commodities produced and distinctions have been drawn between 'agricultural', 'industrial' and 'service' commodities. Other structures which have been argued to be important however include the destination of goods produced, namely foreign or domestic, the time period over which the goods are consumed, the production ownership structure and the division of sales revenue between wage costs and profits.

The structural divisions with which this study is concerned however are those between agricultural, industrial and service activities. The term 'structural change' as used in this study therefore relates to the processes by which economic resources are transferred from one form of production structure to another such that the proportion of these resources devoted to agricultural, industrial and service production changes.

The criteria used in decomposing economic activity into these three categories have been widely discussed elsewhere and it is not proposed to examine these here.[3] However fundamental to any division is the view that there is more homogeneity within than between categories

which is sufficient to require separate treatment of these categories in economic analysis. Some of the reasons for examination of separate sectors are discussed in subsequent chapters. In discussing these sectors this thesis adopts two types of classification. Firstly, activities are divided into agriculture, industry and services using the International Standard Industrial Classification (ISIC). The detailed allocation is given in chapter 2; and in chapters 7 and 8 services are compared with a 'goods' sector which includes agricultural and industrial activities.

A second distinction which is drawn is that between 'marketed' goods and services and 'non-marketed' services.[4] Once again the reason for this distinction stems from the belief that the processes operating in the 'marketed' sector are different from those in the 'non-marketed' sector. For Johnston (1975), who introduced the definitions, the crucial difference between the sectors was that only price movements in marketed outputs were important for inflation. Bacon and Eltis (1976) argued that the distinction was important because only the market sector could produce the consumption, investment and exportable goods and services necessary for an economy's internal and external equilibrium.

The non-market sector is therefore a subset of the service sector, marketed services being combined with goods production to give a 'market' sector. The non-market sector may also be thought of as a subset of the public sector since almost all non-marketed services are produced and/or distributed under public ownership.[5] The public sector in many countries is of course also involved in the production of marketed goods and services. In this thesis however the term 'public sector' is generally applied only to that part which is non-marketed. Finally in some parts of the thesis the ISIC category

'community, personal and social services' is considered separately (and abbreviated to 'social services'). Most of this group of services in most countries is publicly-owned and non-marketed, though there are likely to be varying degrees of private and marketed services within it. However as indicated in chapters 2 and 3 data limitations sometimes necessitate the use of 'social service' data to approximate the non-market sector and for this reason the terms 'social services' and 'non-market sector' may be used interchangeably.

The term 'development' or 'economic development' is also used extensively throughout the following chapters. There is now a vast literature within economics (and other disciplines) devoted to defining what is meant, and ought to be meant, by 'development'. It is increasingly recognised and advocated that the earlier use of per capita income increases as an index of development must now be supplemented by indices of income distribution, consumption of 'basic' commodities and other social indicators. In this thesis however the term 'economic development' is used to refer to the growth in per capita incomes. This is not intended to convey any view of development, but rather is used to express in summary form the processes by which per capita income increases.

Before turning to an examination of structural change two further methodological issues should be considered - problems of measurement of service sector outputs, and problems of causality associated with the structural change/development relationship and the market/non-market analysis.

Any analysis of structural change involving service sectors must handle the problem of measuring the outputs of some services. The use of net output or value added to measure the flow of goods and services produced is only reliable for those goods and services which have

exchange prices by which they may be valued. Non-marketed services, by definition, have no exchange prices and must therefore be valued by some other measure. For these services output has usually been measured by non-material inputs costs - mainly wages and salaries. Thus changes in the 'output' of these services are more accurately to be seen as changes in inputs, making comparisons with marketed outputs difficult. Indeed some would argue that output comparisons of this sort are meaningless or misleading.

The primary concern of this thesis is however with structural changes in employment which can be more readily compared across sectors. However as will be seen in Part 3, explanations of employment growth differences across sectors often rely on output or productivity differences and hence measurement problems persist. The view taken here is that it is preferable to use available service 'output' data despite their difficulties, provided they are treated with caution and used in conjunction with other information on service sector real output and productivity.

Causality problems are common within economic relationships where a priori reasoning may simultaneously suggest that for two variables x and y, $y = f(x)$ and $x = g(y)$. This is true for the structural change/development relationship. Engel's law may be used for example to predict that increases in per capita incomes will cause the composition of an economy's output to change towards industrial, and away from agricultural, goods. Alternatively it has been argued that it is the process of structural change, whereby resources move from low productivity (often agricultural) sectors to high productivity (often industrial) sectors, which generates per capita income increases. Examining patterns of structural change in chapter 2 it is not desired to establish or test for causality in the structural

change/development relationship. Rather the objective is to identify the nature and extent of the relationship across countries and over time.

The Bacon and Eltis (1976) analysis has also been criticised on causality grounds. In particular conclusions on the effects of non-market sector growth on the rest of the economy based on accounting identities have been criticised. Since accounting identities do not model economic behaviour, clearly they cannot be used to establish behavioural patterns. They may however assist in understanding the processes which affect economic behaviour. Chapter 3 considers these issues in more detail.

Footnotes

1. See, for example, Chenery (1960), Chenery and Taylor (1968), Chenery and Syraquin (1975). This literature is discussed in chapter 2.

2. Page references are those of the 1970 edition edited by Andrew Skinner.

3. A useful summary of the arguments may be found in Gershuny (1977 1978).

4. In principle there is no reason why some goods should not be included in the non-marketed sector, though in the original definition by Johnston (1975) only services were included. Free school milk and meals would be examples of non-marketed goods.

5. Bacon and Eltis however argue that the non-market sector should include that part of private sector output subsidised by government. See Bacon and Eltis (1976, pp. 27-31).

P A R T 2

STRUCTURAL CHANGE, THE NON-MARKET SECTOR AND TAX REVENUES

C H A P T E R 2

STRUCTURAL CHANGE AND ECONOMIC DEVELOPMENT: THE ROLE OF THE SERVICE SECTOR

2.1 INTRODUCTION

There have been many attempts over the last thirty years or so to identify patterns of structural change during the development process. Most of the early attempts concentrated on the relationship between the agricultural and industrial sectors using cross-section and/or time series data, of which Kuznets (1957) and Chenery (1960) are among the most prominent. In more recent years increasing attention has been devoted to the role of the service sector, and differing methodologies have been adopted to analyse its development path. These methodologies fall into three categories:

(i) Cross-section/time series studies of developed and less developed countries (e.g. Fuchs (1968), Chenery and Taylor (1968), Bhalla (1973), Chenery and Syrquin (1975)).

(ii) Comparisons of sector shares in contemporary LDCs with the earlier economic history of now developed countries, (e.g. Turnham (1971), Berry (1978)).

(iii) Country case studies, such as Bhalla (1970), for Taiwan and Philippines, and Berry (1978), for Columbia.

The 1970s also witnessed increasing documentation of the phenomenon usually referred to as 'de-industrialisation'. This literature, including OECD (1975), Bacon and Eltis (1976), UN-ECE (1977), and Blackaby (1978), has highlighted the decline in the absolute or relative size of the industrial sector (or parts of it) in many developed countries. A decline in the manufacturing sector's share of employment over the decade has been identified most frequently, though a similar decline in the sector's output share is also confirmed in several countries.[1] This decline is almost always accompanied by a rising share of the service sector, public and/or private, and has created renewed interest, in developed countries, in the sector's economic characteristics.[2]

This chapter will investigate how cross-section studies of structural change can accommodate the recent evidence on 'de-industrialisation' and in particular, assess the choice of appropriate functional forms for such studies. Alternative functional forms are proposed which, it is argued, provide a better description of recent patterns of structural change than those previously used.

In Section 2.2 current approaches to, and evidence on, relationships between the agricultural, industrial and service sectors during the development process are considered. Section 2.3 investigates alternative functional forms which in Section 2.4 are tested using data from 30 developed and less developed countries in 1960 and 1970. These results allow some observations on the role of the service sector to be made in Section 2.5, and the results are summarised and some conclusions drawn in Section 2.6.

2.2 STRUCTURAL CHANGE AND DEVELOPMENT

2.2.1 Current Evidence

Testing the relationship between sector shares and per capita income has not always produced consistent results on the role of the service sector. For example, Chenery and Taylor (1968), using cross-section data for 54 countries over the period 1950-63, found strong evidence for a relationship between per capita income and the shares of industry and agriculture in GNP, but little evidence to support a similar relationship for the service sector.[3] They used a relationship of the form

$$\log Y = \alpha + \beta \log X + \gamma (\log X)^2 + \partial \log N \qquad (2.1)$$

where Y represents the respective sector share in GNP, X is per capita

income, and N is population. Similar results were obtained using a semi-log form, by Chenery and Syrquin (1975) and Chenery (1979) who also included a term in $(\log N)^2$ in some regressions.[4] On the other hand Fuchs (1968) tested the hypothesis

$$Y = \alpha + \beta/X \qquad (2.2)$$

where Y now represents the respective sector shares in employment, and X is per capita income, for 20 OECD countries in 1960. He found highly significant regression co-efficients for all three sectors.

The evidence of Chenery and Taylor (1968), Fuchs (1968), and Chenery and Syrquin (1975) may be summarised as strongly supporting the following hypotheses, where Y_A and Y_I are the shares of GNP (or employment) in the agricultural and industrial sectors respectively, and X is per capita income:

$$\partial Y_A/\partial X < 0 \qquad \partial^2 Y_A/\partial X^2 > 0 \qquad (2.3)$$

$$\partial Y_I/\partial X > 0 \qquad \partial^2 Y_I/\partial X^2 < 0 \qquad (2.4)$$

Fuchs (1968) also found support for the hypothesis that

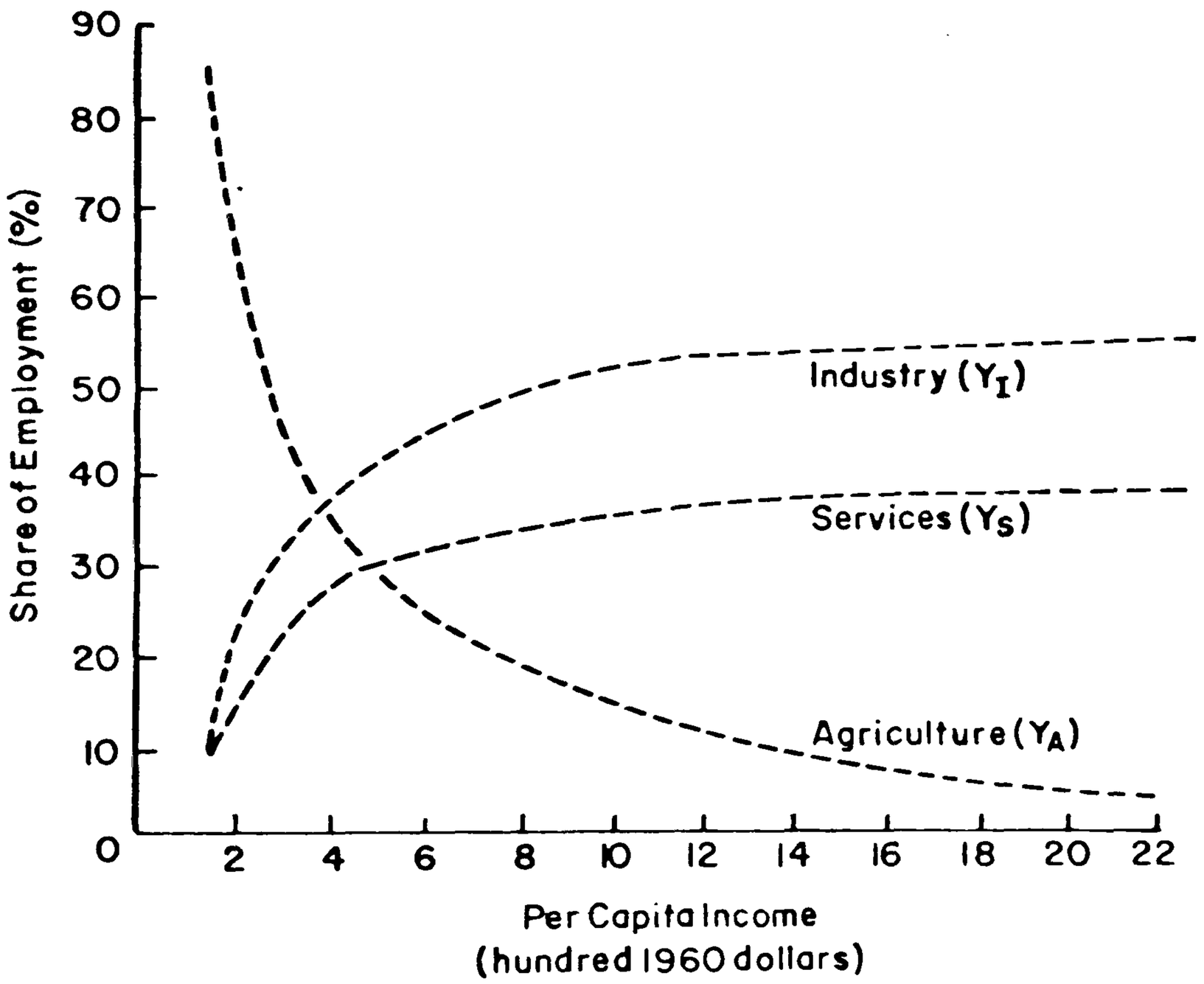
$$\partial Y_s/\partial X > 0 \qquad \partial^2 Y_s/\partial X^2 < 0 \qquad (2.5)$$

where Y_s is the share of services in total employment.

The relationships found by Fuchs, which are illustrated in Figure 2.1 indicate that agricultural employment falls most rapidly in the early stages of development, giving rise to rapid increases in the shares of industry and services in total employment. However the decline in the share of agriculture slows with increasing development, approaching asymptotically a share of about 3%, while industry and services approach asymptotically, shares of about 57% and 40% respectively.[5]

FIGURE 2.1

RELATIONSHIPS BETWEEN SECTOR SHARES AND PER CAPITA INCOME. (FUCHS, 1968)



Broadly similar paths were obtained by Chenery and Taylor (1968) and Chenery and Syrquin (1975) using logarithmic forms.

2.2.2 Functional Forms

Precise functional forms are rarely dictated by economic theory but it is important that they should not be at variance with the main relevant theoretical postulates, and can at least approximate these within an appropriate range of values. The choice of the above functional forms by Chenery and Taylor, Chenery and Syrquin, and Fuchs, while chosen partly for analytical convenience, can be supported by a priori economic reasoning. Development theory suggests, not only that a relative transfer of resources from agricultural to non-agricultural sectors may be expected as per capita income rises, but also (under the assumption of diminishing marginal returns) that the pace of resource transfer will slow as income rises. At low income levels, when the economy is almost entirely agrarian and marginal productivity in agriculture is low, a larger decrement in the agricultural labour force is possible for a given increment in productivity, than when the share of the agricultural sector in the total economy is smaller, and marginal productivity higher. Since it has been observed that income and productivity tend to rise together over time, ceteris paribus, equal and successive rises in income can be expected to be associated with successively smaller decrements in the resource share of the agricultural sector. Both the logarithmic and reciprocal functional forms can accommodate this.

Economic theory can however also support the evidence of a relative resource transfer from industry to services. It is frequently argued, for example, that service outputs possess higher income elasticities of demand in aggregate, than industrial outputs, so that, ceteris paribus, as per capita income rises, industrial outputs will rise faster than

service outputs at first, but slower later (assuming the coincidence of higher elasticities with higher income levels). Secondly, there is evidence suggesting that service sector productivity tends to increase more slowly than industrial productivity. Thus, at higher income levels, with agricultural surplus labour all but exhausted, a transfer of labour from the industrial to the service sector will be required even to maintain relative output growth rates between sectors. Baumol (1967) has explicitly modelled this process. Thus it can be argued that the process of structural change for any country can be expected to follow paths similar to those shown in Figure 2.2, with the industrial and service employment shares both growing at the expense of the agricultural share as income rises.[6] However once the agricultural share becomes fairly small (though it may continue to fall), the service sector share begins to expand at the expense of the industrial sector share.

It is clear that, in testing for the patterns of structural change proposed in Figure 2.2, neither the reciprocal functional form used by Fuchs, nor the logarithmic forms preferred by Chenery and Taylor or Chenery and Syrquin, will suffice. The simple form used by Fuchs clearly can not capture the rise and subsequent decline in the share of industry, nor can it model the sigmoid shape proposed for the service sector. The quadratic log and semi-log forms, while they can account for the declining industrial share, are also unable to model the service sector share. Alternative functional forms are therefore proposed in Section 2.3.

2.3 AN ALTERNATIVE APPROACH

2.3.1 Alternative Functional Forms

It was noted in Section 2.2 that the increase in the service sector

FIGURES 2.2 and 2.3

ALTERNATIVE RELATIONSHIPS BETWEEN SECTOR EMPLOYMENT SHARES AND PER CAPITA INCOME

Figure 2.2

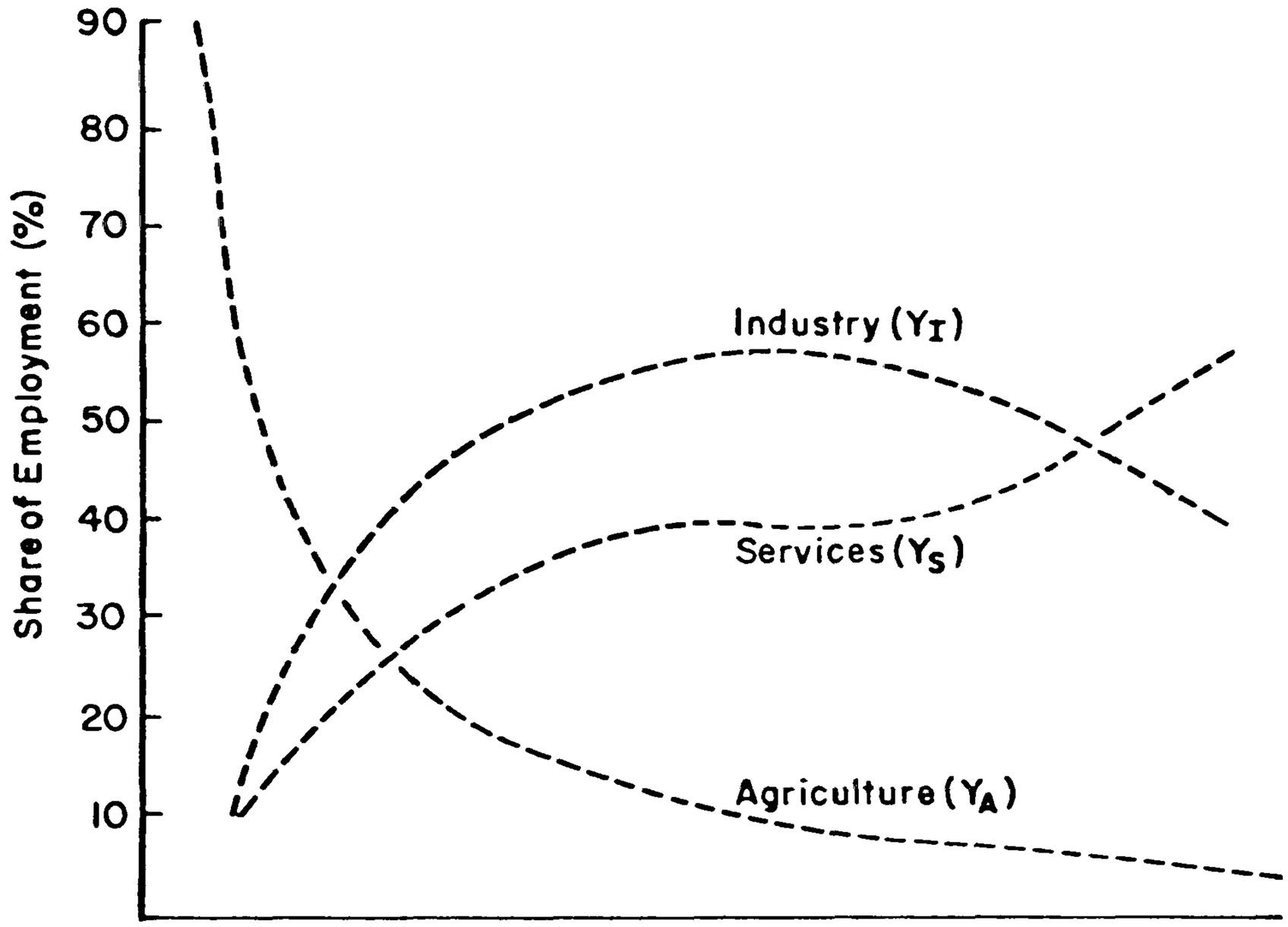
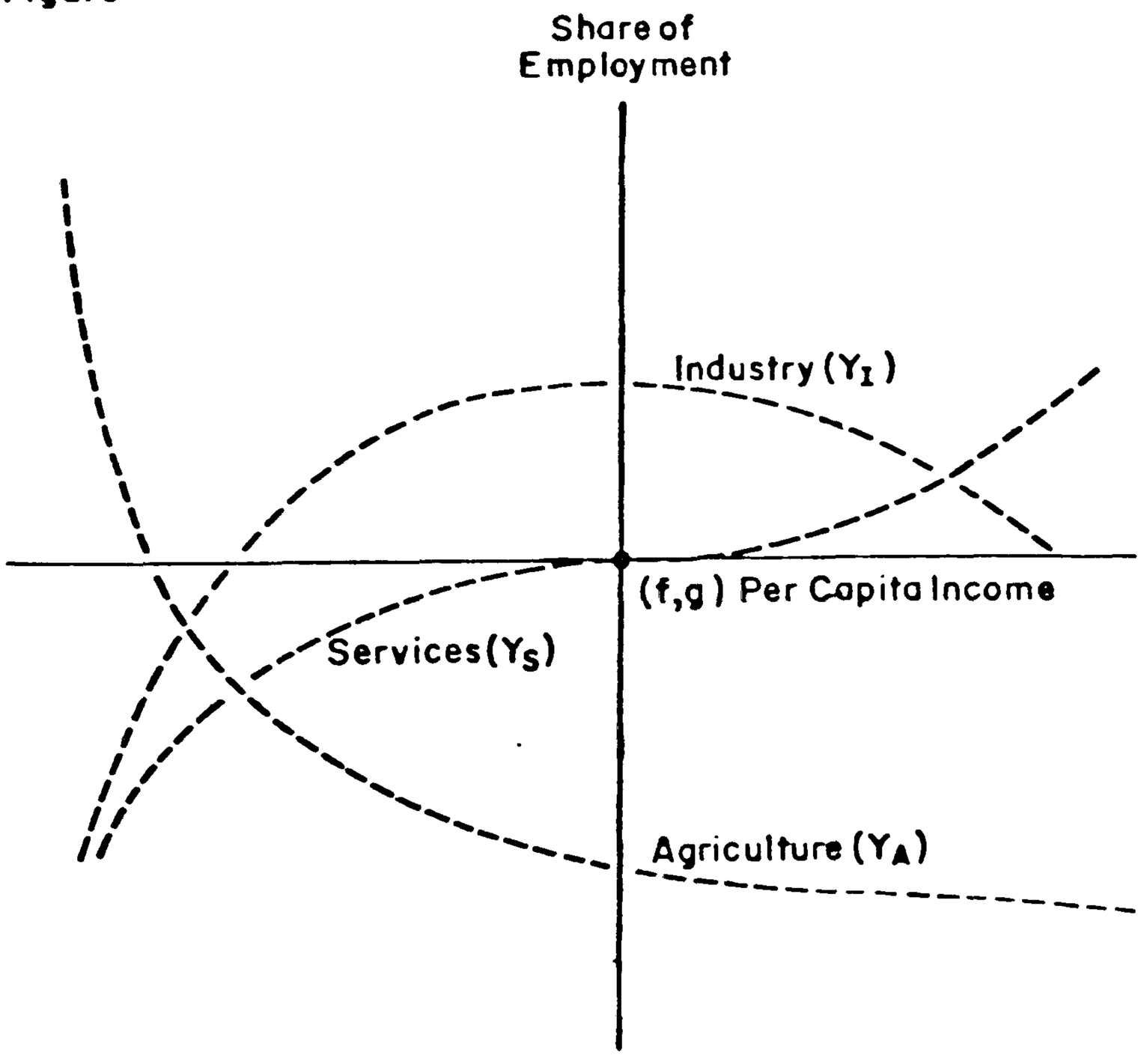


Figure 2.3



share at the expense of the industrial sector share tends to occur only when the agricultural share is already very small. Thus, in specifying functional forms for the three sectors, Y_A, Y_I and Y_S, the simple form

$$Y_A = a_1 + b_1/X \tag{2.6}$$

which Fuchs (1968) found predicted well, may still be used for the agricultural sector.

The most appropriate functional form to approximate Y_S in Figure 2.2 is a cubic in X, whereby

$$Y_S = a_2 + b_2X + c_2X^2 + d_2X^3 \tag{2.7}$$

This will give the sigmoid shape which it is desired to capture in the Y_S function. It might in fact be expected that the service sector share will <u>eventually</u> approach some maximum value asymptotically, which cannot be accounted for by a cubic functional form. However, it is likely to provide a suitable approximation over the range of values currently available, and indeed, for some way beyond. In fact, to approximate Y_S a function with a single inflexion point, rather than the maximum and minimum normally associated with cubic functions, is required. This will occur if $a_2 = b_2 = c_2 = 0$, which can be achieved by moving the origin in Figure 2.2 to the point of inflexion, as in Figure 2.3.

The Y_I function could be specified as a quadratic in X, but this would impose the restrictions that the decline in the industrial sector share exactly mirror its earlier increase and will predetermine the per capita income at which the maximum industrial share occurs. In addition, it is unlikely that specifying all three functions thus would yield values for the three sector shares which meet the required condition

$$Y_A + Y_S + Y_I = 1 \tag{2.8}$$

Y_I will therefore be treated as a residual for estimation purposes and specified as,

$$Y_I = 1 - Y_A - Y_S \tag{2.9}$$

Letting the new origin at the inflexion point in Y_S be (f, g), new variables y and x can be created such that,

$$y = Y - g \tag{2.10}$$

$$x = X - f \tag{2.11}$$

and the new functions y_A, y_I and y_S will be

$$y_A + g = a_1 + b_1\{1/(x + f)\} \tag{2.12}$$

$$y_S = d_2x^3 \tag{2.13}$$

$$y_I = 1 - 3g - y_S - y_A \tag{2.14}$$

2.3.2 Inter-sectoral Relationships

An alternative method of testing the hypothesis that an increasing service sector share is associated first with an increasing industrial share and then with its decline is to examine inter-sectoral relationships directly, rather than considering sector shares as functions of per capita income. Thus, a direct relationship between Y_I and Y_S may be examined. The main problem with this approach is of course that both Y_I and Y_S are endogenous variables and therefore neither is truly 'independent'. However for the purpose of describing how these sectors change relative to each other, either can be used for statistical purposes, as an 'independent' variable, though it is important to stress

that this approach provides no basis for discussion of causality between variables.

There are however two reasons why it may be preferable to examine directly inter-sectoral relationships such as these. First, it is suggested that inverse movements in the industrial and service sector shares can be expected once there is a relatively small proportion of the population in agriculture, and therefore little surplus labour remains in the sector. This is likely to occur at higher income levels, but different countries may reach this position at different per capita incomes. Kaldor (1966) and Lewis (1978) have argued that the U.K., for example, reached a low share of its population in agriculture at low levels of per capita income compared to other developed countries.[7] Of course, the use of cross-section data to examine patterns of structural change taking place over time must always involve the problem that different countries, while experiencing similar changes, will not necessarily experience them at exactly the same income levels. When testing for the relationships shown in Figure 2.2, however, this can lead to substantial horizontal, or near horizontal sections to the Y_I and Y_S functions, where no statistical relationship would be identified, making the sigmoid shape of the Y_S function difficult to identify in particular. By considering a direct relationship between Y_I and Y_S, which will be first positive, and then negative-sloping (see Figure 2.4B), these horizontal sections will appear as a point, or number of proximate points, making this function more readily identifiable.

Second, there are numerous problems associated with international comparisons of per capita incomes, especially when both developed and less developed countries are included. In many LDCs income estimates are unreliable because of poor collection methods and differing

definitions, and their coverage is frequently less comprehensive than in developed countries. In addition, conversion to dollar-equivalents may be inaccurate due to under (or over) valued, and fluctuating exchange rates, though this problem can be partially overcome using procedures developed by Kravis et. al. (1975, 1978). The coverage of demographic data in many LDCs, though also incomplete, is usually more reliable than income data. Therefore it is considered preferable here to examine patterns of structural change using inter-sectoral relationships despite the econometric limitations.

2.3.3 Testing the Hypothesis

Equations (2.12), (2.13) and (2.14) may be solved to eliminate x giving relationships between y_A, y_I and y_S, such that

$$\begin{bmatrix} y_I \\ \\ y_S \end{bmatrix} = \Pi \begin{bmatrix} 1 \\ z \\ z^2 \\ z^3 \end{bmatrix} + \begin{bmatrix} -y_A \\ \\ 0 \end{bmatrix} \qquad (2.15)$$

where $z = (y_A + \gamma)^{-1}$, $\gamma = (g - a_1)$ and Π is a 2 x 4 matrix.

Furthermore

$$y_I = \mu_1 + \mu_2\{1/y_S^{1/3} + \delta)\} - y_S \qquad (2.16)$$

where coefficients μ_1 and μ_2 can be determined from the Π matrix,[8] and $\delta = f\, d_2^{1/3}$. These functions suggest that non-linear relationships can be expected between sector shares, possible outcomes of which are illustrated in Figure 2.4.

To examine how patterns of structural change may have varied in the light of the 'de-industrialisation' evidence, regressions on equation (2.16) are of most significance. Since the agricultural sector

FIGURES 2.4A and 2.4B

ALTERNATIVE RELATIONSHIPS BETWEEN AGRICULTURAL, INDUSTRIAL AND SERVICE SECTOR EMPLOYMENT SHARES

Figure 2.4A

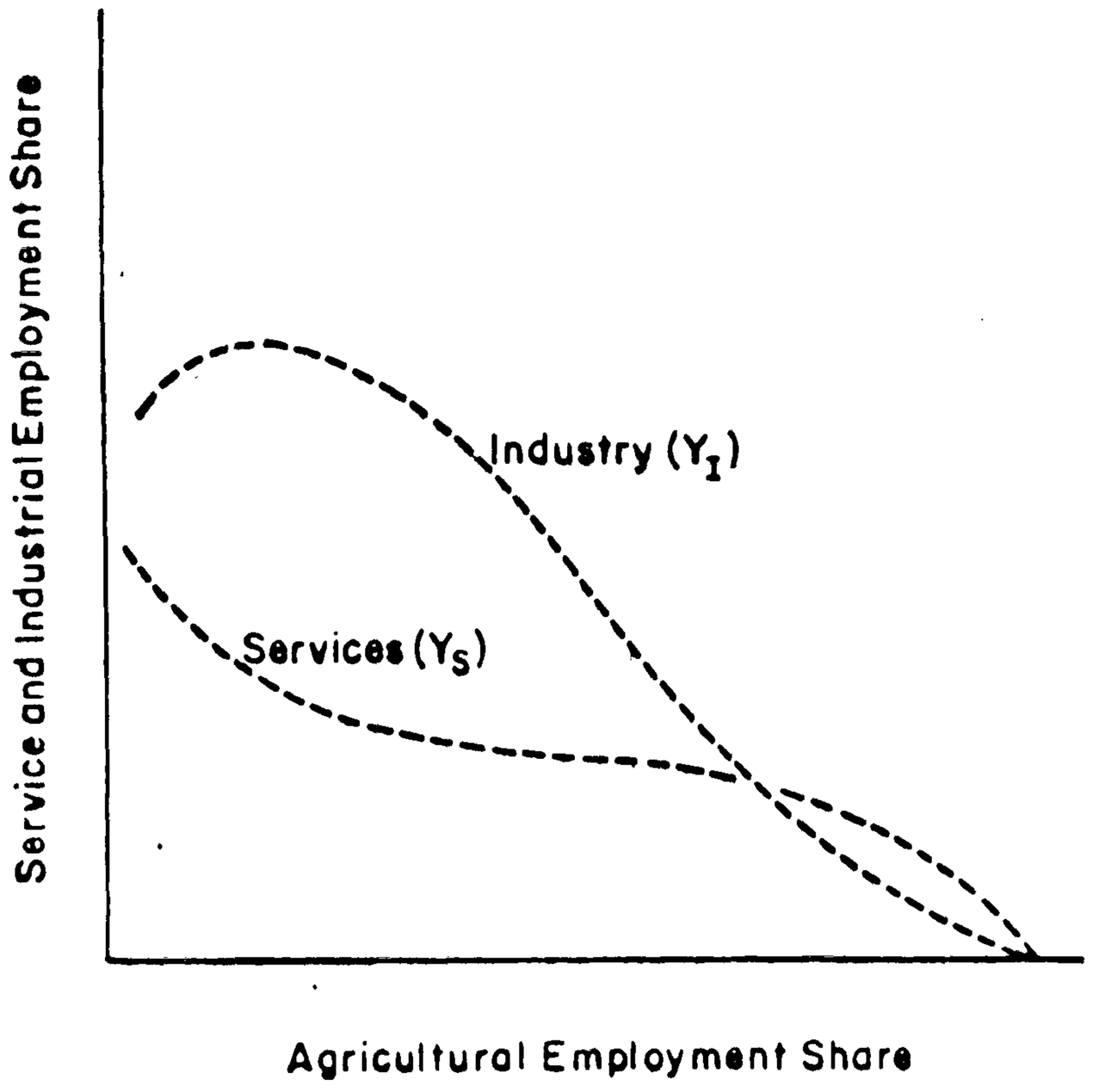
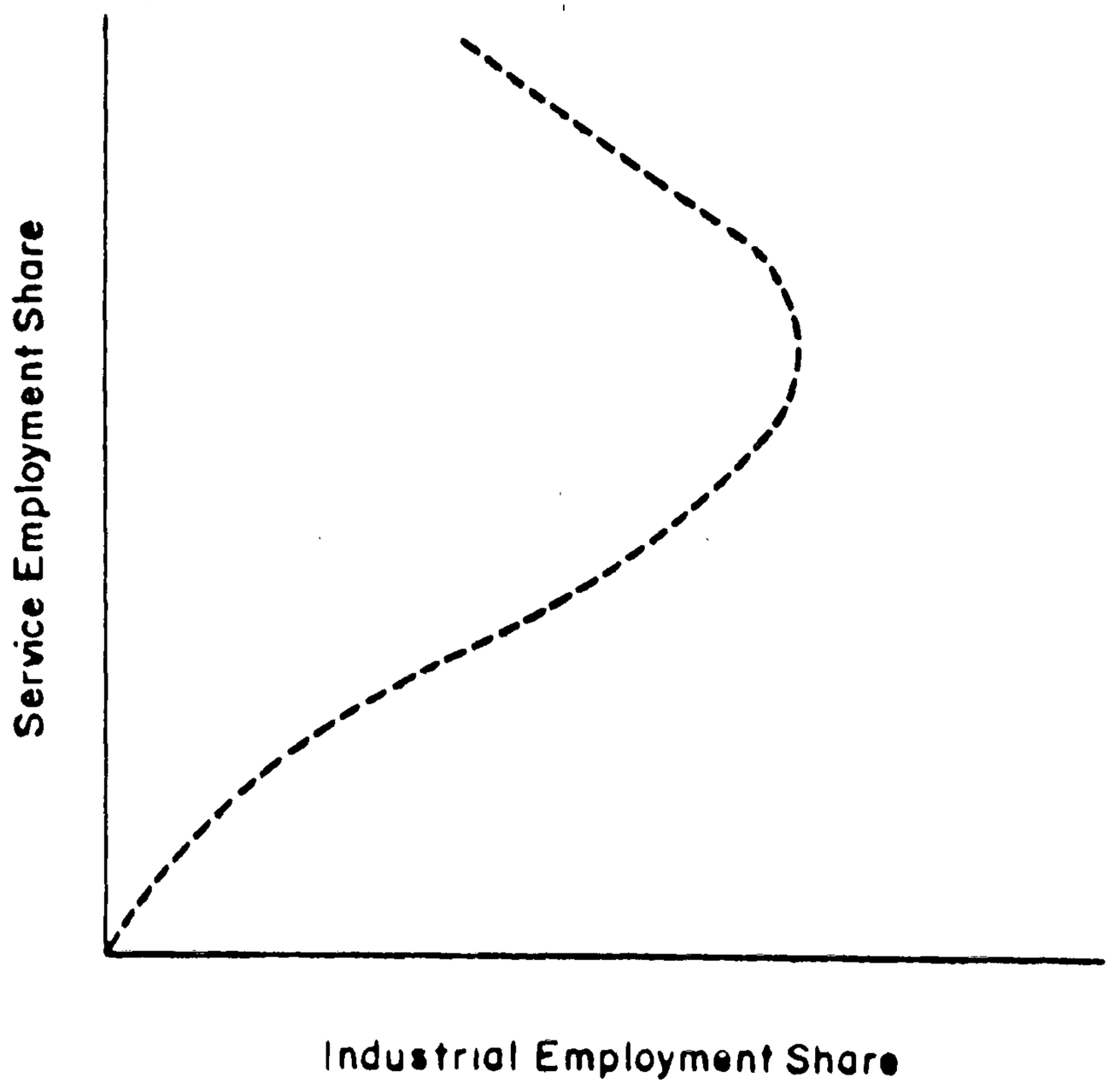


Figure 2.4B



share is already small when inverse movements in the service and industrial sector shares can be expected, regressions with y_A as the independent variable are unsuitable. However, if the functional forms proposed in (2.15) and (2.16) are valid, then regressions on (2.15) also ought to provide a suitable description of changes in y_S and y_I relative to y_A.

In testing for these relationships, sectoral definitions slightly different from those discussed above are adopted. In particular, using the International Standard Industrial Classification (ISIC), the service sector is defined to include transport, communications, finance, wholesale and retail trade, and community, social and personal services, while the industrial sector includes only manufacturing. Public utilities, construction, mining and quarrying (including petroleum and gas) are therefore excluded. This avoids the arbitrary classification of those activities which do not fall clearly into any one sector, and allows regression results to be interpreted without considering whether some marginally included sub-sector is biasing the results of the aggregate sector. Previous studies of structural change which have classified all economic activities into three sectors have included public utilities and construction variously in the service or the industrial sector, with mining and quarrying allied either with agriculture or industry.[9] It is shown in Appendix 2.1 that the effects of excluding these activities on (2.15) and (2.16) is to alter the values of the intercept terms in the first equation of (2.15) and (2.16). Results of ordinary least squares (OLS) regressions on these equations, using a sample of 30 developed and less developed countries in 1960 and 1970, are shown in Table 2.1(A).[10] Before discussing the results, however, some explanation of the sample and the regression methodology is necessary.

The sample of 30 countries was selected to give roughly equal numbers of developed and less developed countries. This avoids the problem of poor predictions for developed countries arising from estimated equations based on samples of mainly less developed countries. Secondly, countries with particularly small economically active populations (less than one million) were not included to avoid possible distortions in data on sector shares. Less developed countries with small populations are particularly heterogenous, with some being geographically small and with small agricultural sectors (e.g. Kuwait), while others may be large, sparcely populated, agrarian societies (e.g. Niger). Unfortunately data are only available on the basis of nation states though this may not be the most economically meaningful classification. Thirdly, to minimise inconsistencies in data classification across countries, all data are from the I.L.O. Yearbook of Labour Statistics in which all countries are classified by the 1958 ISIC (for 1960 data) and the 1968 ISIC (for 1970 data). In addition, in all countries in the sample, data are based on census returns in years around 1960 and 1970, rather than inter-census projections. Since most such censuses are decennial there are few countries for which comparable data are available after 1970.

The sector shares data require some adjustment before performing the regressions. Since using per capita income as an independent variable has already been rejected, partly because of inaccuracies inherent in such data, its use to estimate g and f (the coordinates of the inflexion point in Y_S) is also prohibited. However for the purpose of performing OLS regressions on (2.15) and (2.16) only g needs to be predetermined. This was achieved by running OLS regressions on (2.16) using an iterative procedure to obtain the value of g which minimised the sum of squared residuals. This yielded

a final value of g = 0.366 suggesting the turning point in the industry/service relationship from a positive-sloping to a negative-sloping one, occurs with a service sector share around 37%.[11]

Finally, it is interesting to examine the development of the service sector at a more disaggregated level since it is often claimed that the service sector contains a greater diversity of economic activity than other sectors. Table 2.1(A) therefore includes regressions for the social service sub-sector which tends to be publicly-owned, being made up mostly of education, health and public administration services. It is shown in Appendix 2.2 that if the social service sector share, y_{ss}, is approximated by a similar cubic function to that proposed for the aggregate service sector, then inter-sectoral relationships involving y_{ss} can be estimated in the same way as for those involving y_s. With the additional assumption that the points of inflexion in both functions occur at the same per capita income level, the value of unity imposed on the co-efficient on y_s in (2.16) is unnecessary on the coefficient on y_{ss}. Thus results for both sectors should be similar if the cubic functional forms proposed for both sectors are valid.

2.4 REGRESSION RESULTS

Table 2.1(A) presents regressions on the pooled 1960 and 1970 data for the 30 country sample, while Tables 2.1(B) and 2.1(C) present similar regressions for each year, allowing differences between the two years to be investigated.

In each table, regressions (i), (ii) and (iv) are on equations (2.15) and (2.16) in Section 2.3.3, and regressions (iii) and (v) are for the social service sector. Regressions (vi) to (x) are comparable linear regressions for the inter-sectoral relationships

in (i) to (v). These linear forms would be obtained if the reciprocal form $y_i = \alpha + \beta/X$ was assumed for all i sectors, such as Fuchs (1968). Thus it is easily seen how the explanatory power of the proposed functions in (i) to (v) compare with at least one alternative.

Examining regressions (i) to (iii) in Table 2.1(A) reveals that all co-efficients have the predicted signs; results from both service sectors in regressions (ii) and (iii) are similar; and both have opposite signs on co-efficients to those in regression (i), as predicted.[12] Although the t-statistics suggests that individually co-efficients are not significantly different from zero at the 5% level, as can frequently occur with polynomial regressions, when considered together, an F-statistic confirms all regressions significant at the 1% level. Comparing $\bar{R}^2$s between regressions (i) - (iii) and (vi) - (viii), it is clear that both linear and non-linear forms perform equally well. The $\bar{R}^2$s in comparable regressions are both high, and very close. In regression (ii) for example, an $\bar{R}^2 = 0.8784$ compares with $\bar{R}^2 = 0.8760$ for the linear regression in (vii). Tables 2.1(B) and 2.1(C) present results for 1960 and 1970 separately, and confirm that the similarity in predictive ability is evident in both years, though the explanatory power of the regressions is noticeably better for 1960 than for 1970. This result confirms that the non-linear function, while not necessary to predict structural patterns involving the agricultural sector, can nevertheless provide as good an explanation as the linear form. Figures 2.5A and B illustrate the similarity in the predictions of these two functions for the service/agriculture and industry/agriculture relationships.

Comparing regressions (iv) and (ix) where y_I is related directly to y_S the improvement in the predictive ability of the non-linear form, from the linear, is considerable, with the non-linear

TABLE 2.1(A): REGRESSION RESULTS OF INTER-SECTORAL RELATIONSHIPS

	Dependent Variable	Independent Variables: Intercept	y_A	y_s	y'_{ss}	$y_s\delta$	$y'_{ss}\lambda$	z	z^2	z^3	$\bar{R}^2$
(i)	y_I	14.99 (3.25)	-1.00†					-86.84 (-2.98)	169.01 (2.76)	-112.35 (-2.64)	0.8565*
(ii)	y_s	-6.07 (-1.03)						33.30 (0.90)	-64.69 (-0.83)	44.71 (0.82)	0.8784*
(iii)	y'_{ss}	-7.63 (-1.64)						50.30 (1.64)	-112.19 (-0.83)	84.82 (1.46)	0.7603*
(iv)	y_I	0.1727 (14.27)		-1.00†		-0.2020 (-34.28)					0.7799*
(v)	y'_I	0.4957 (6.00)			-0.6767 (-1.78)	-0.5570 (-5.41)					0.6985*
(vi)	y_I	-0.1654 (-32.33)	-0.3752 (-17.38)								0.8455*
(vii)	y_s	-0.0452 (-7.13)	-0.5283 (-19.74)								0.8760*
(viii)	y'_{ss}††	0.0453 (9.64)	-0.2089 (-13.25)								0.7605*
(ix)	y_I	-0.1369 (-16.89)		0.5738 (9.60)							0.6237*
(x)	y'_I	0.0498 (5.65)			1.2630 (8.10)						0.5404*

Notes to Tables 2.1(A)-(C) on page following Table 2.1(C).

TABLE 2.1(B): REGRESSION RESULTS OF INTER-SECTORAL RELATIONSHIPS, 1960

Dependent Variable	Independent Variables									
	Intercept	y_A	y_s	y'_{ss}	$y_s\delta$	$y'_{ss}\lambda$	z	z^2	z^3	$\bar{R}^2$
(i) y_I	14.71 (2.47)	-1.00†					-84.83 (-2.23)	164.08 (2.03)	-108.25 (-1.91)	0.8780*
(ii) y_s	-1.67 (-0.30)						4.65 (0.13)	-3.06 (-0.04)	0.78 (0.01)	0.9276*
(iii) y'_{ss}	-5.47 (-1.54)						35.31 (1.41)	-77.95 (-1.33)	59.04 (1.30)	0.9160*
(iv) y_I	0.1560 (9.24)		-1.00†		-0.1938 (-26.17)					0.8146*
(v) y'_I	0.3977 (2.76)			0.0778 (0.12)		-0.4105 (-2.40)				0.7764*
(vi) y_I	-0.1595 (-22.57)	-0.3994 (-13.65)								0.8647*
(vii) y_s	-0.0584 (-9.42)	-0.5036 (-19.63)								0.9299*
(viii) y'_{ss} ††	0.0483 (11.80)	-0.2215 (-17.79)								0.9174*
(ix) y_I	-0.1191 (-10.48)		0.7036 (8.79)							0.7247*
(x) y'_I	0.0511 (5.21)			1.6034 (9.10)						0.7385*

TABLE 2.1(C): REGRESSION RESULTS OF INTER-SECTORAL RELATIONSHIPS, 1970

Dependent Variable	Independent Variables									
	Intercept	y_A	y_s	y'_{ss}	$y_s\delta$	$y'_{ss}\lambda$	z	z^2	z^3	$\bar{R}^2$
(i) y_I	13.90 (1.49)	-1.00†					-79.09 (-1.36)	151.30 (1.26)	-99.28 (-1.21)	0.8105*
(ii) y_s	-5.05 (-0.36)						27.72 (0.31)	-54.52 (-0.30)	38.59 (0.31)	0.8084*
(iii) y'_{ss}	-13.47 (-1.06)						91.02 (1.04)	-206.21 (-1.03)	156.63 (1.03)	0.5395*
(iv) y_I	0.1973 (11.24)		-1.00†		-0.2174 (-21.52)					0.7268*
(v) y'_I	0.5174 (4.71)			0.9646 (-2.02)		0.5711 (-4.21)				0.5783*
(vi) y_I	-0.1700 (-22.06)	-0.3536 (-10.62)								0.8172*
(vii) y_s	-0.0310 (-2.63)	-0.5337 (-10.49)								0.8134*
(viii) y'_{ss} ††	0.0429 (5.10)	-0.1911 (-5.66)								0.5539*
(ix) y_I	-0.1473 (-12.42)		0.4817 (5.21)							0.5628*
(x) y'_I	0.0563 (3.75)			0.8614 (3.30)						0.2838*

Notes to Tables 2.1(A)-2.1(C)

* F-statistic significant at the 1% level.

† Parameters constrained to values of -1.00 as dictated by (2.15) and (2.16).

†† Regression of y'_{SS} on y'_A (not y_A).

(1) $Y_S\delta = \{1/(Y_S^{(1/3)} + \delta)\}$, $y'_{SS}\lambda = \{1/(y'^{(1/3)}_{SS} + \lambda)$, $z = (Y_A + \gamma)^{-1}$, ($\delta = 0.90$; $\lambda = 1.35$; $\gamma = 2.10$).

(2) $y = Y - g$, where $g = 0.366$; $y' = Y - m$, where $m = 0.153$. See Appendix 2.2.

(3) Figures in parentheses are t-values. All regressions are run over 56 observations (1960 = 30, 1970 = 26).

Source: Appendix 2.3.

FIGURE 2.5A

LINEAR AND NON-LINEAR RELATIONSHIPS BETWEEN THE SHARES OF AGRICULTURE AND SERVICES IN EMPLOYMENT (1960 AND 1970)

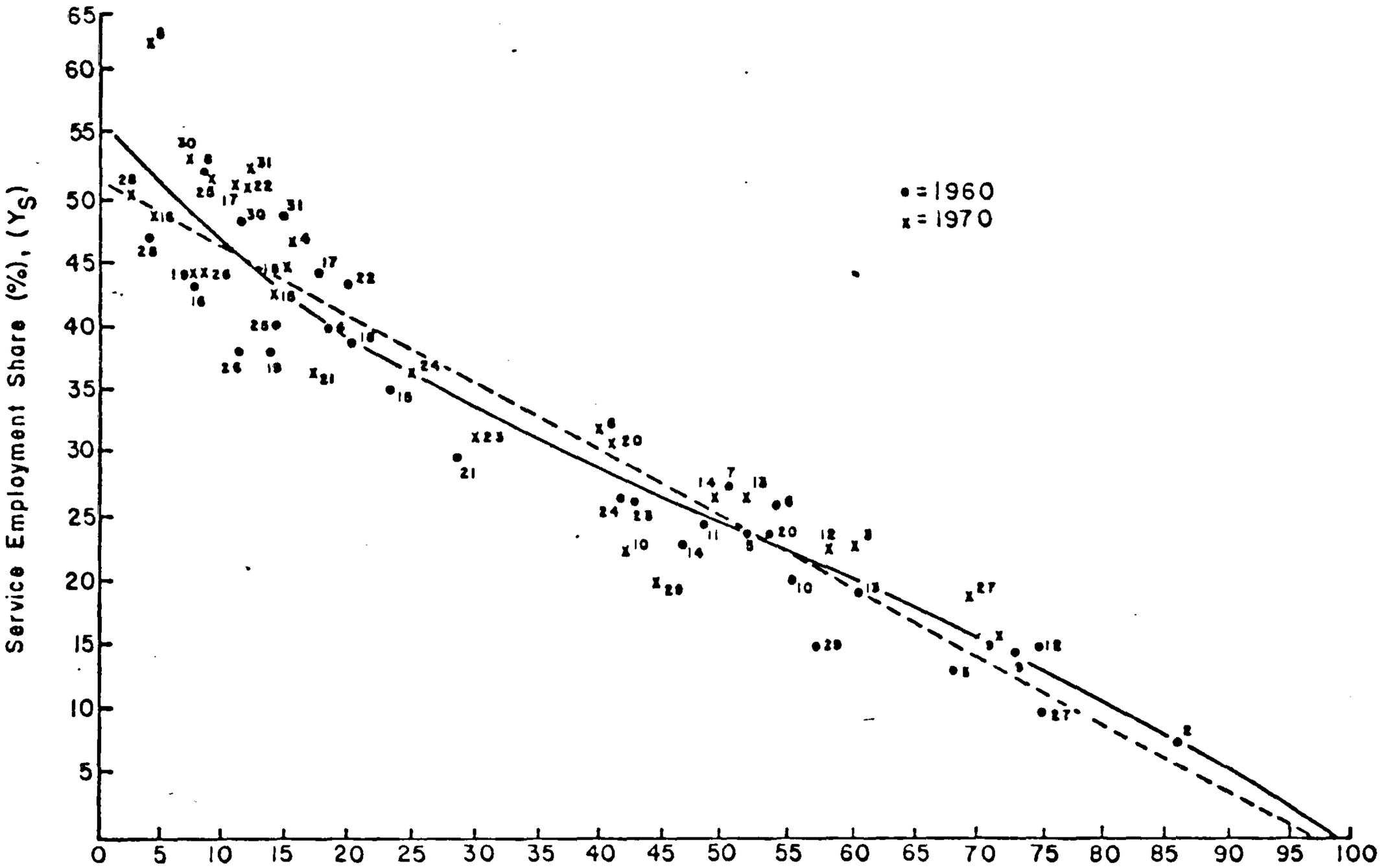
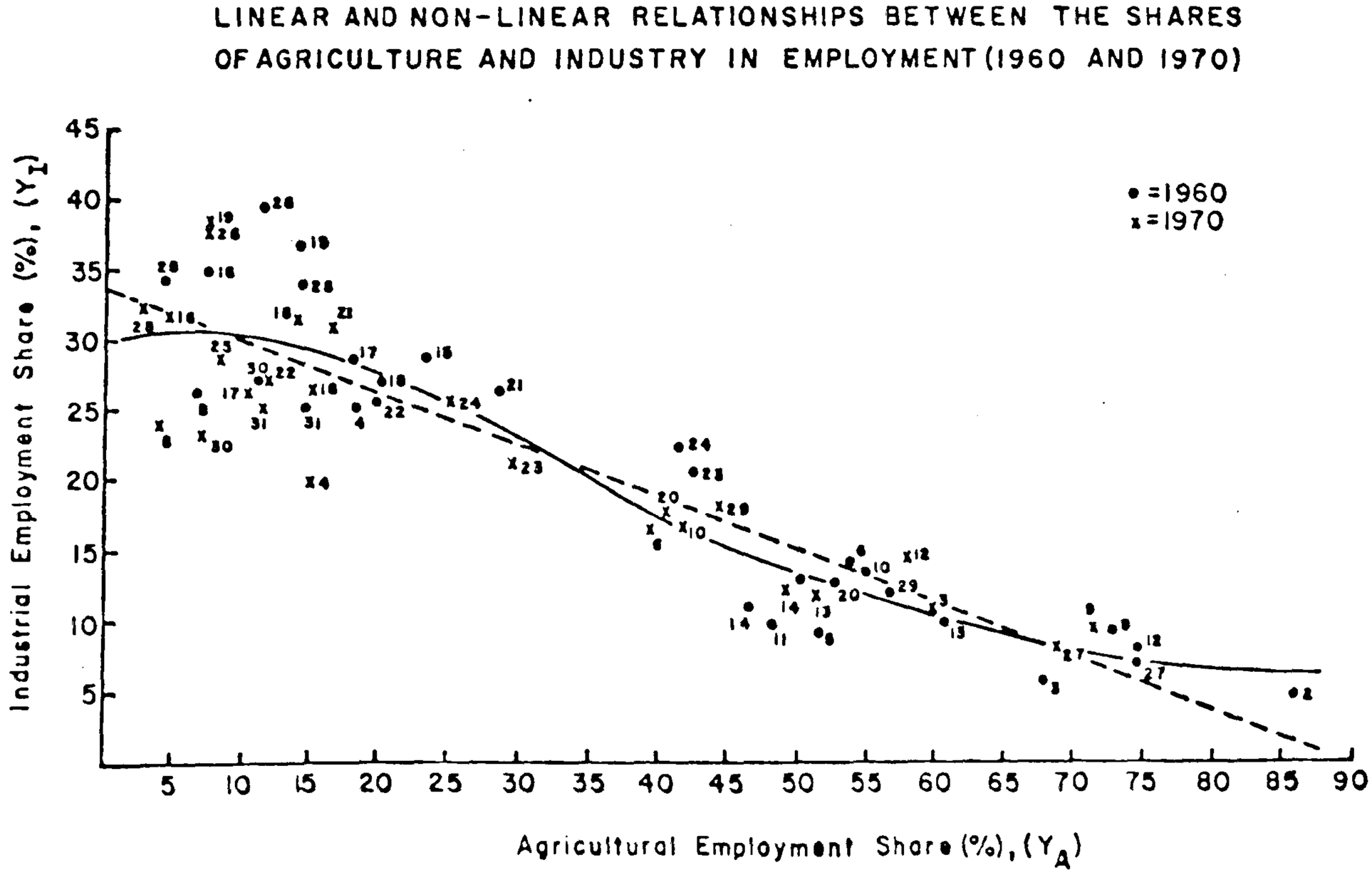


FIGURE 2.5B

LINEAR AND NON-LINEAR RELATIONSHIPS BETWEEN THE SHARES OF AGRICULTURE AND INDUSTRY IN EMPLOYMENT (1960 AND 1970)



regression giving an $\bar{R}^2 = 0.78$, and the equivalent linear regression giving an $\bar{R}^2 = 0.62$. A similar improvement is evident in the industry/social service relationships in regressions (v) and (x), the linear form giving an $\bar{R}^2 = 0.54$, compared with $\bar{R}^2 = 0.70$ in the non-linear regression. Again, in all cases, the sign predictions on co-efficients are satisfied, and F-statistics are significant at the 1% level. (Comparisons of the alternative functions are illustrated in Figures 2.6A and B).[13]

Tables 2.1(B) and 2.1(C) confirm that the improvement in $\bar{R}^2$ by choosing the non-linear function, occurs both in 1960 and 1970, despite the fact that fewer observations exist on the negatively sloping portion of the relationship, in 1960. The improvement in the $\bar{R}^2$ is however especially evident in 1970; in the industry/social service relationship, for example, the linear form in (x) gives an $\bar{R}^2$ of only 0.28, while the $\bar{R}^2$ of 0.58 is produced by the non-linear regression in (v). However it is also clear that a reduction in the predictive ability of the regressions from 1960 to 1970 occurs in the non-linear as well as in the linear regressions, suggesting that there are other factors affecting the 1970 sector shares, not accounted for by the use of the non-linear form.

Since the regressions in Tables 2.1(A)-(C) have been estimated separately it is necessary to ensure that regressions within each table are mutually compatible, i.e. that they satisfy the condition

$$Y_A + Y_I + Y_S + Y_R = 1 \tag{2.17}$$

where Y_R represents employment in activities not included in the three main sector definitions. From equation (2.10), since $Y_i = y_i + g$, this is equivalent to testing

$$Y_A + Y_I + Y_S + Y_R = 1 - 4g \tag{2.18}$$

Figure 2.6A

Linear and Non-Linear Relationships Between the Shares of Industry and Services in Employment

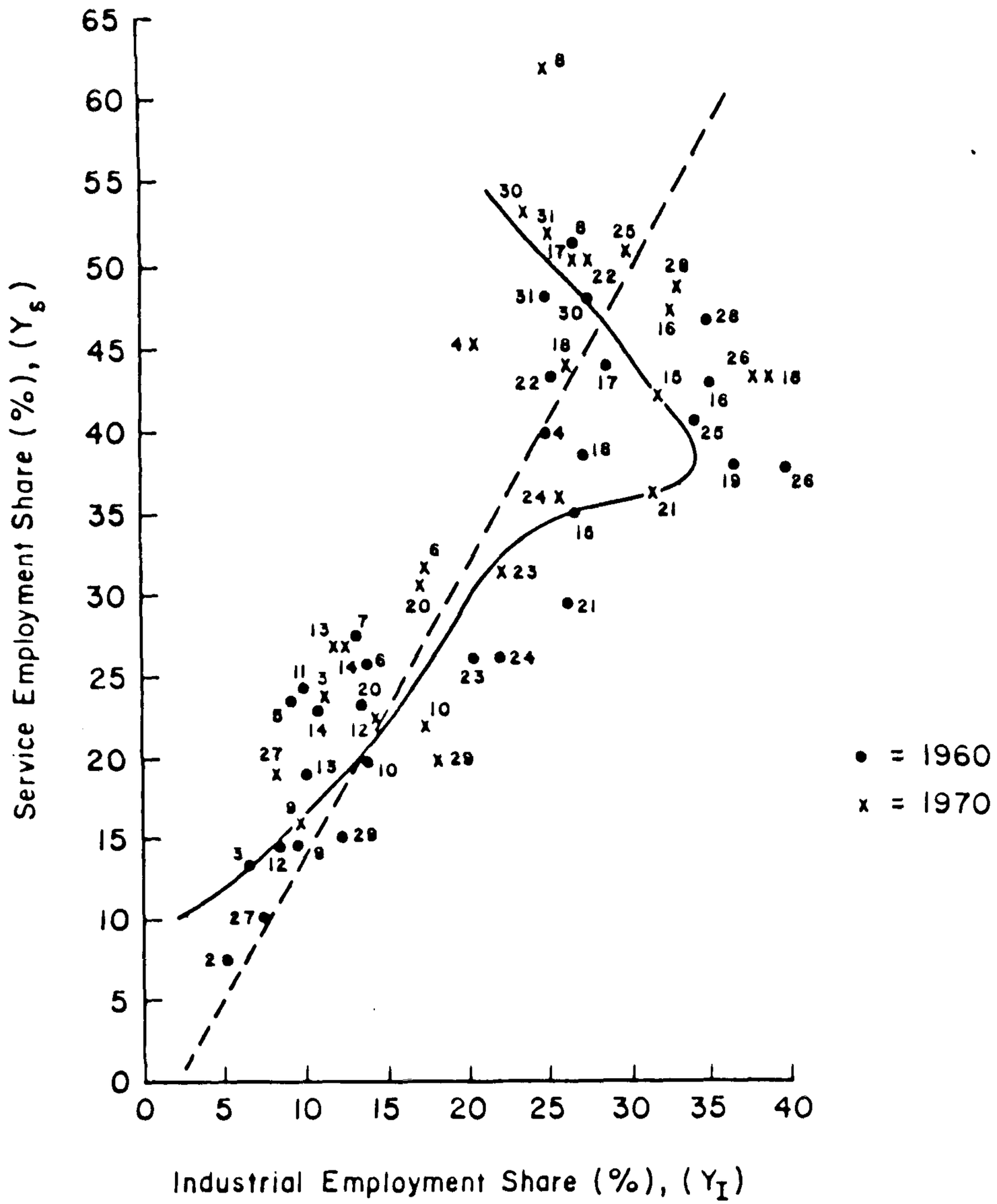
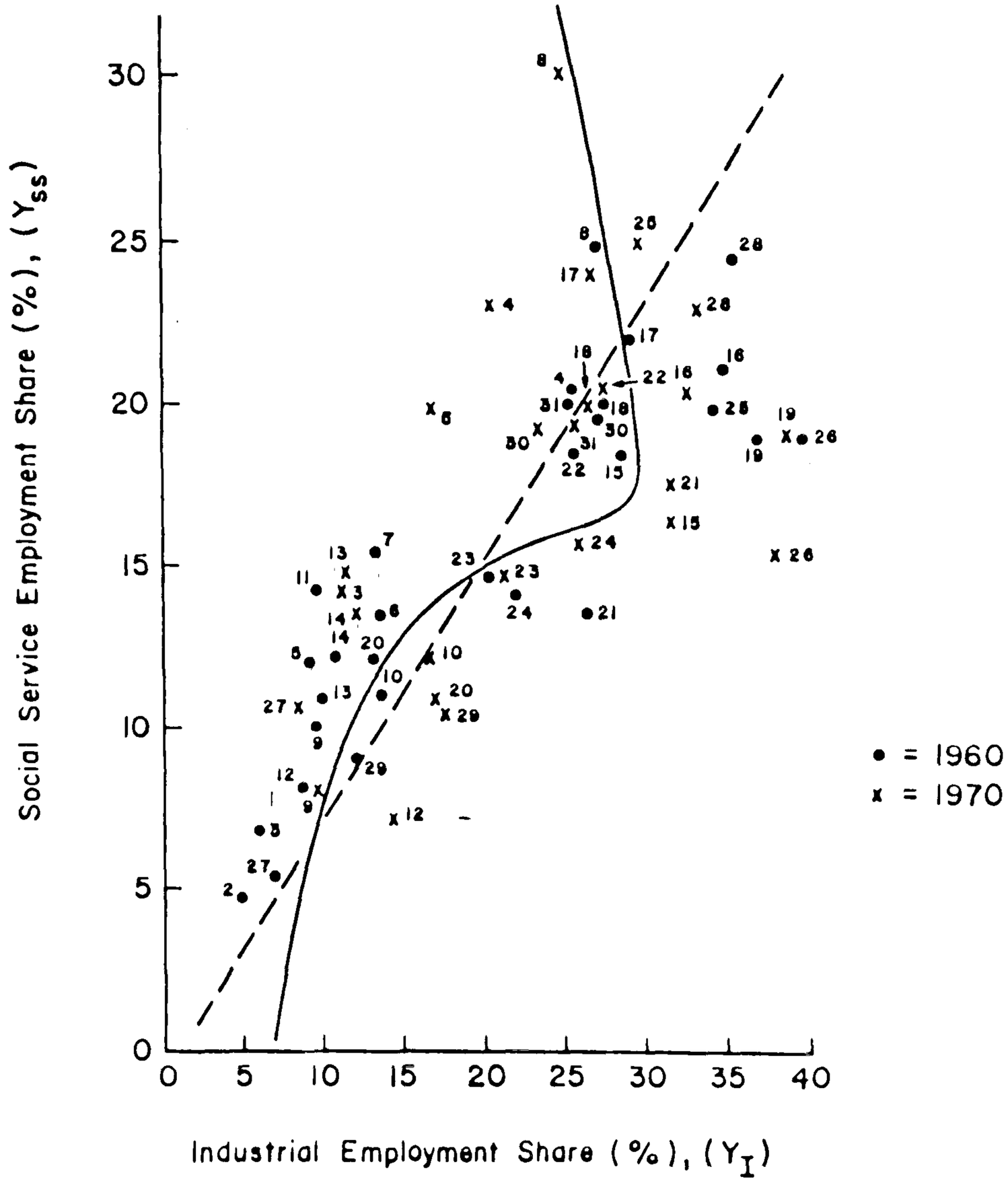


Figure 2.6B

Linear and Non-Linear Relationships Between the Shares of Industry and Social Services in Employment



which may be done by estimating $\hat{y}_I$, $\hat{y}_S$ and $\hat{y}_R$, for each observation of y_A, from regressions (i) and (v) in Table 2.1(A) and regression (A1.9) in Appendix 2.1. y_I must also be estimated using regression (iii) in Table 2.1(A). If the mean of $\hat{y}_A + \hat{y}_I + \hat{y}_S + \hat{y}_R$ is not significantly different from -0.464 (1 - 4(0.366)), the null hypothesis that the aggregation condition in (2.18) is satisfied by the regressions, may be accepted. Performing such a test does indeed confirm that neither of the estimated means (using the two estimates of $\hat{y}_I$) are significantly different from -0.464 at the 5% level, so supporting acceptance of the null hypothesis, and hence the values of the coefficient estimates. A similar test for the linear regressions in Table 2.1 also indicated acceptance of the null hypothesis.

2.5 THE ROLE OF THE SERVICE SECTOR

The results of Table 2.1 confirm that, although changes in the industrial and service sector shares may not be uniquely associated with per capita income levels, patterns of structural change involving all three sectors can be discerned across countries. It has also been shown that 'de-industrialisation' is a phenomenon which can be incorporated into this method of modelling structural change. Indeed the regression results confirm that the systematic pattern of development of the service sector in particular will not now be adequately identified using functional forms which have been commonly used in the past. This was found to be especially true of the social service sector where the goodness of fit obtained for non-linear regressions between the industrial employment share, y_I, and the social service employment share, y_{SS}, was a considerable improvement over the linear alternative. In 1970 for example, the linear regression suggested a

statistically significant but weak relationship between y_I and y_{SS} ($\bar{R}^2 = 0.28$) but the non-linear form, with an $\bar{R}^2$ of 0.58 reveals much greater cross-section similarity.

The results of this analysis provide some interesting general observations on the role of the service sector. Firstly, the service sector share begins to expand at the expense of the industrial sector share at values of about 37% and 34% for the two sector shares respectively, and about 18% for the social service sector. The service sector is therefore already large relative to manufacturing when it begins to expand in association with a contracting manufacturing sector. More relevant than the precise share values at the 'turning point' (which are bound to vary between countries for different domestic reasons), is the extent to which sector shares change. It may be noted from Figure 2.6 for example, that as the industrial sector share declines the social service share increases by more than the total service sector implying a rise in the share of the social component of total services. This accords well with expectations - the 'post industrial' phase of development being associated particularly with increased provision of public welfare services, with fairly high income elasticities as proposed by the Clark-Fisher hypothesis.[14]

The data also confirm that the de-industrialisation phase is not a temporary phase, as is sometimes claimed, arising from slower growth or recession affecting the industrial sector disproportionately, hence reducing its share. The data here represent the relatively fast growing period up to 1970, and examining changes in individual countries between 1960 and 1970 in Figure 2.6 shows many were experiencing de-industrialisation. In any case, the cross-section data in Table 2.1(B) suggests some evidence of de-industrialisation

was already present by 1960.

The service sector is of course composed of many different types of service activity. Some services may be expected to decline in importance in association with the industrial decline. In the USA for example, the falling share of manufacturing in employment has been associated with a falling employment share of the 'distribution' ----sector - a sector largely involved in transportation of industrial goods. Restaurant, hotel and catering services on the other hand may be considered to be less influenced by the manufacturing sector (though backward linkages obviously exist) offering to the consumer an alternative type of expenditure to manufactured goods. In the de-industrialisation stage of development therefore the increasing share of services in aggregate is likely to be accompanied by changing weights of individual services within the total. The previously noted relative increase in social services is an example of a sector with relatively few backward linkages to the manufacturing sector which is therefore relatively unconstrained by declines in the manufacturing sector's employment share.

2.5.1 Predicting Structural Change

The role of the service sector in <u>earlier</u> stages of development is also highlighted by this cross-section evidence, offering general support to previous theoretical predictions. Figures 2.5 and 2.6 indicate that in the early stages, when the agricultural sector is still large, the service sector expands faster than manufacturing. At an intermediate stage (with the manufacturing employment share in excess of about 20%) the reverse is true with manufacturing becoming the fastest growing sector in employment terms. Thereafter services again dominate,changes in the manufacturing share eventually becoming negative. Several authors have pointed to the need of a newly

industrialising country to invest in infrastructure facilities including electricity, drainage and transport systems. This has been advocated particularly in the literature on public sector growth during development, since it is common for many of these services to be publicly provided.[15] More recently, migration theory and evidence on the 'informal' sector suggest that various types of small-scale services can be expected to grow rapidly during industrialisation. While the evidence presented here explicitly excludes public utilities, it is likely that it is the expansion of many of the services discussed above in the early stages of development, which is being picked up in the data. Once many of these 'prerequisites' for industrial growth have been provided however the growth of many services, relative to industry, will be curtailed. Whether this applies to the informal service sector remains unclear with little evidence yet on whether significant and sustained industrial development will encourage or discourage this sector. It may be that the growth of informal services, unique to developing countries, will not be suitably represented by cross-section data involving developed countries. Nevertheless the empirical predictions of this model seem to be in agreement with the available theoretical predictions.

It is also interesting to note from Figure 2.6 that a service sector can be expected to emerge before a manufacturing sector (when $Y_I = 0$, $Y_S > 0$), but the reverse is true of the social service sector (when $Y_{SS} = 0$, $Y_I > 0$). Both these observations accord well with the predictions of development theory - a sector providing mainly agricultural services is likely to exist, if limitedly, before a country begins to industrialise, but social services, frequently financed by governments, are only possible when a country achieves sufficient productivity gains to provide a marketable surplus to

pay for these services. This tends to occur in the industrialisation process.

The data in Figure 2.6 confirm the evidence of Berry (1978) and others that Latin American countries have experienced a considerable expansion in their social and total services, most notably Argentina (4) and Mexico (6).[16]

It must be stressed, however, that the functions employed here are not meant to be used to predict at very large values of the service sector share since, as was pointed out earlier, they do not account for a slowing down of the increase in the service sector share which can be expected as it approaches high values. In the absence of observations in that range at present, this study has not attempted to construct more complicated functions to incorporate this phenomenon.

Finally it is interesting to apply the functional forms illustrated in Figure 2.2 to the 1960 data used by Fuchs (1968), since Table 2.1(B) suggested that the alternative functional forms proposed also perform better in 1960 than the linear functions. Fuchs hinted that such a pattern might be relevant for the U.S.A. but considered that his data supported a different pattern among his 20 O.E.C.D. country sample, namely the pattern illustrated in Figure 2.1. In fact, had Fuchs applied the functions forms in (2.12), (2.13) and (2.14) to his data he would have found that they fitted equally well, and with the inclusion of the U.S.A. in the sample, the data fit better to these functional forms than to the reciprocal forms which Fuchs used.[17]

2.5.2 Changes since 1970

The absence of strictly comparable data for most countries in the sample after 1970, as discussed in Section 2.3.3 makes comparisons with more recent evidence on structural change rather difficult. Nevertheless it is interesting to examine the extent to which the

patterns identified in 1960 and 1970 remain representative. Table 2.2 presents some summary statistics on changes in the four sectors in developed and less developed countries between 1970 and 1978.[18] Of the 30 countries in the previous sample there is evidence on sectoral shares in the late 1970s in 26, usually from labour force sample surveys. This source can sometimes suggest markedly different sectoral shares from census data, in the same year, so that the data in Table 2.2 must be interpreted with care, and provide only general indications of sector share trends. The table shows the average percentage point change in sector employment shares for the period, for a group of 15 developed countries, and a group of 11 less developed countries. Standard deviations are given in parentheses as one indicator of the degree of similarity of sector share changes across countries.

It can be seen that the decline in the share of agriculture was much greater on average in LDCs, with a mean percentage point change of -8.0 compared to only -2.3 in the developed countries. There was however much more diversity among the LDCs. For the manufacturing sector, as expected the LDCs show a rise on average of just over 1 percentage point while the developed countries record a 3.3 percentage point fall. It is interesting to note that, apart from the agricultural sector the differences among LDCs as measured by the standard deviation, are not very different from developed country differences. The service sector shows a slightly larger rise in the developed countries than in less developed countries (5.1 and 4.8 percentage points respectively), but relative to manufacturing, the service sector share has increased by 8.4 percentage points in the developed countries, as against only 3.7 percentage points in the LDCs. The pattern for social services is again similar to that for total services.

TABLE 2.2

PERCENGAGE POINT CHANGES IN SECTORAL EMPLOYMENT SHARES, 1970-78

	Agriculture	Manufacturing	Services	Social Services
11 Less Developed Countries:				
mean	-8.0	+1.1	+4.8	+3.3
standard deviation	(8.2)	(2.2)	(3.1)	(2.4)
15 Developed Countries				
mean	-2.3	-3.3	+5.1	+3.9
standard deviation	(1.9)	(2.7)	(3.1)	(2.9)

Note: Of the 30 countries listed in Appendix 2.3, the four omitted here are Argentina, India, Greece and Yugoslavia.

Source: I.L.O. Yearbook of Labour Statistics, Geneva, 1976-80.

It would seem then that time-series changes in the sample countries after 1970 are broadly in agreement with the earlier cross-section evidence, despite data difficulties. The post-1970 evidence confirms that the agricultural share falls most rapidly in the earlier stages of development; the service share increases sizably in both groups of countries, but only in the developed countries is this associated with a declining manufacturing share; and social services increase with manufacturing in the LDCs but at the expense of manufacturing in the developed countries. Perhaps the most surprising result of Table 2.2 is that both service sector shares in LDCs appear to be increasing much faster than manufacturing. It may be that this partly reflects the faltering pace of industrialisation in the 1970s in many LDCs, causing employment to increase particularly in service sectors.

2.5 SUMMARY AND CONCLUSIONS

This chapter began by considering alternative methodologies used to examine the role of the service sector in development, and discussed some of the recent evidence on 'de-industrialisation'. Following the cross-section approach Section 2.2 briefly outlined some of the evidence already available on changes in economic structure during the development process, highlighting the work of Fuchs (1968), Chenery and Taylor (1968) and Chenery and Syrquin (1975). It was argued that, in the light of the increasing evidence of de-industrialisation in many developed countries, it was no longer appropriate to use the functional forms used hitherto to estimate structural change from cross-section data, because these would lead to false predictions.

Section 2.3 proposed alternative functional forms which are more in agreement with theoretical predictions, and can allow for the industry/service relationship to be both positively and negatively sloping for different ranges of income. In Section 2.4 it was discovered that the empirical evidence strongly supported these functional forms, in preference to linear alternatives. However, even adopting these functional forms, there was some weakening of the relationships between 1960 and 1970 suggesting that there were factors affecting the relative sector shares not accounted for by these functional forms. Nevertheless strong support was obtained for the view that service sectors expand particularly rapidly relative to industry in the earlier and later stages of development, with substantial similarity across countries.

Footnotes

1. See Brown and Sheriff (1978).

2. Two books in particular, Bell (1974) and Gershuny (1978) have examined growth of the service sector in the U.K. in some detail. Until the 1970s most analyses of the service sector had been confined to U.S.A. data.

3. Using ordinary least squares Chenery and Taylor (1968) obtained insignificant co-efficients for the service sector relationships and $\bar{R}^2$s less than 0.4, most of this appearing to be due to the inclusion of log N in the function. Chenery and Syrquin (1975) found significant co-efficients but still obtained $\bar{R}^2$s of less than 0.3. When employment share, rather than GNP share, was used as a dependent variable, $\bar{R}^2$s improved to around 0.5. See Chenery and Syrquin (1975, pp.38-9 and 49).

4. See Chenery and Syrquin (1975, pp.16-18).

5. See Fuchs (1968, pp.24-31).

6. Fuchs was aware of this tendency in the U.S.A. but seems to have seen this as a deviation from the established pattern among his 20 O.E.C.D. country sample. See Fuchs (1968, p.31).

7. In 1970 the U.K. had only 2.5% of its economically active population in agriculture compared to 7.5% in West Germany and 4.2% in the U.S.A., though per capita income in the U.K. was only about 60% of U.S. and 80% of West German G.D.P. (See Kravis et. al. (1975, p.9)).

8. It can be shown that,

$$\mu_1 = \pi_{2\,1} + \pi_{1\,1} + \gamma, \text{ and } \mu_2 = (\pi_{2\,3}/\pi_{2\,2}).\delta$$

9. See Fuchs (1968, pp.14-16).

10. Data for Brazil (1970) and Peru (1970) were omitted because earlier regressions indicated they diverge strongly from the pattern of other LDCs. Their inclusion would not significantly alter the comparisons in Table 2.1. Also data on economically active population rather than employment was used because although it may include varying amounts of unemployment, this effect is likely to be small and allows a larger sample of LDCs to be taken.

11. The turning point will, in fact, occur with a service sector share slightly higher than g, since the continuing, if small, decline in y_A, will allow y_I to continue to increase until the acceleration in the growth of y_S, outweights that effect.

12. In (2.15)

$$\Pi = \begin{bmatrix} 1 - 3g + d_2f^3 & -3d_2b_1f^2 & 3d_2b_1^2f & -d_2b_1^3 \\ -d_2f^3 & 3d_2b_1f^2 & -3d_2b_1^2f & d_2b_1^3 \end{bmatrix}$$

so that sign predictions are clearly satisfied in regressions (i), (ii) and (iii).

13. Figures 2.5 and 2.6 suggest that heteroskedasticity may be present in the regression equations. However testing each of the ten regressions in Table 2.1(A) using the Spearman Rank Correlation test did not confirm heteroskedasticity with correlation coefficients of -0.54, -0.46, -0.16, 0.08, 0.10, -0.35, -0.30, -0.14, 0.41 and 0.16 for the ten regressions respectively. Only in regressions (i), (ii) and (ix) could an argument for heteroskedasticity being present be made. Even here it does not seem inappropriate to assume homoskedasticity.

14. Fisher (1939) and Clarke (1940) provided one of the earliest, but still persuasive hypotheses on the development of the service sector. They argued that countries could be expected to move from mainly primary to secondary to service production during development. Because high income elasticities are associated with many service activities, it is argued that this sector only becomes large after the 'basic necessities' of the primary sector are provided and most demands for manufacturing goods are satisfied. This process has become known as the Clark-Fisher hypothesis.

15. See Katousian (1970) and Thirlwall (1972, p.40-1), on the growth of the service sector in general in the early development stages; and Bird (1971), Musgrave (1969) on the public service sector in particular.

16. In the case of Argentina, there has also been a fall in the industrial sector share as services have expanded. The Mexican service sector data is also likely to be over-estimated in 1970 because of changes in definitions. See Appendix 2.3.

17. Running OLS regressions on Fuchs (1968) data, using functional forms in (2.13) and (2.14) gives $\bar{R}^2$s of 0.72 and 0.63 for Industry and Services respectively.((2.14) expressed in terms of X becomes $y_I = a - b(X - f)^3 - c/X)$. This compares with Fuchs results of 0.73 and 0.65 respectively (see Fuchs (1968, p.29n)). Including data for the United States in 1960, changes in the $\bar{R}^2$s respectively to 0.72 and 0.71, while adding the U.S. observation to regressions of the functional forms used by Fuchs gives $\bar{R}^2 = 0.65$ for Industry and $\bar{R}^2 = 0.61$ for Services. Thus, with the inclusion of the U.S. data, the functional forms of (2.13) and (2.14) give unambiguously improved results, even from this limited sample.

18. Where 1978 data were not available the nearest available year was used (usually 1977 or 1979). In the case of Sudan (where data are for 1956 and 1973) and Iraq (where data are for 1957 and 1977) it was assumed that structural changes took place evenly over the whole period, and only the latter half of the period was used to maximise comparability with other countries in the sample.

APPENDIX 2.1: THE EFFECTS OF INCLUDING A 'RESIDUAL' SECTOR

Letting all sectors excluded from y_A, y_I and y_S be represented by y_R, and assuming

$$y_R = \alpha_o + \beta_o/X \qquad \beta_o \leqslant o \tag{A1.1}$$

and $$y_A = \alpha_1 + \beta_1/X \qquad \beta_1 > o \tag{A1.2}$$

it can be shown that

$$y_R = \mu_3 + \mu_4 y_A \quad \Longrightarrow \quad \mu_4 \leqslant o \tag{A1.3}$$

where $$\mu_3 = \alpha_o - \alpha_1(\beta_o|\beta_1) - g\{1 - (\beta_o|\beta_1)\}, \quad \mu_4 = \beta_o|\beta_1$$

Also, equation (2.14) (see text) now becomes

$$y_I = 1 - 4g - y_A - y_S - y_R \tag{A1.4}$$

whence $$y_I = (1 - 4g + d_2f^3 - \mu_3) - 3d_2b_1f^2z + 3d_2b_1^2fz^2 - d_2b_1^3z^3 - (1 + \mu_4)y_A \tag{A1.5}$$

Similarly, substituting equation (2.13) into (2.12) gives

$$y_A = (a_1 - g) + b_1d_2^{1/3}(y_S^{1/3} + f)^{-1} \tag{A1.6}$$

Substituting A1.6 into A1.4 gives

$$y_I = (1 - 3g - a_1 - \mu_3) - b_1d_2^{1/3}(1 + \mu_4)(y_S^{1/3} + f)^{-1} - y_S \tag{A1.7}$$

If $\mu_4 = o$, the inclusion of y_R alters only the intercept terms in the first equation of (2.15) (equivalent to appendix equation A1.5), and (2.16) (equivalent to appendix equation A1.7). If however $\mu_4 < o$ this has the additional effect of removing the constraint that the co-efficient on y_A in (2.15) be equal to unity and alters the value of μ_2 in (2.16).

From A1.1, if $\beta_0 = 0$, then $\mu_4 = 0$ which can be tested for the sample of 30 countries in 1960 and 1970. The results of an OLS regression are (where estimated t-values are in parentheses):

$$y_R = \underset{(-43.84)}{-0.253} - \underset{(-3.96)}{0.097y_A} \qquad \text{(A1.8)}$$

$R^2 = 0.2246$ $\qquad$ $n = 56$

(Only 56 observations are used because two data points are unavailable and a further two are excluded: see footnote 10.)

As may be expected when countries with very large agricultural sectors are included, the hypothesis that $\beta_0 = 0$ may be rejected, though the co-efficient on y_A, despite being significantly different from zero at the 5% level, is small. However, a similar regression, excluding countries with very large agricultural sectors (Sudan, India, Pakistan and Turkey) gives

$$y_R = \underset{(-22.70)}{-0.231} - \underset{(-1.04)}{0.031y_A} \qquad \text{(A1.9)}$$

$R^2 = 0.224$ $\qquad$ $n = 49$

which would suggest that the hypothesis that $\beta_0 = 0$, probably most accurately describes the data. Therefore equations (2.15) and (2.16) may be tested, maintaining the constraints on the relevant variables.

APPENDIX 2.2: ESTIMATING THE SOCIAL SERVICE SECTOR

(a) If the Social Service employment share is a similar cubic function of income as the aggregate Service sector, then estimation of intersectoral relationships involving the Social Service sector requires a new origin at the point of inflexion in Y_{SS}. Letting this point be (ℓ , m), new variables y' and x' can be constructed, such that,

$$y' = Y - m \tag{A2.1}$$

$$x' = X - \ell \tag{A2.2}$$

By a similar procedure to that used for the aggregate service sector it can be shown that if

$$y'_{SS} = e_2 x'^3 \tag{A2.3}$$

$$\text{then} \qquad y'_{SS} = \eta_1 + \eta_2 z' - \eta_3 z'^2 + \eta_3 z'^3 \tag{A2.4}$$

$$\text{and} \qquad y'_I = \mu_4 - \mu_5\{1/(y'^{1/3}_{SS} + \lambda)\} - y'_S \tag{A2.5}$$

$$\text{where} \quad z' = (y'_A + \theta)^{-1}, \quad \theta = m - a_1, \text{ and } \lambda = \ell . e_2^{1/3}$$

Assuming additionally that both the y_S and y'_{SS} functions in (2.13) and appendix equation (A2.3) reach their points of inflexion at the same value of X, (i.e. ℓ = f) then, as shown in Section (b) below, (A2.5) becomes

$$y'_I = \eta_6 - \eta_7\{1/(y'^{1/3}_{SS} + \lambda)\} - \eta_8 y'_{SS} \tag{A2.6}$$

Thus the value of unity imposed on y_S in (A2.5) is not necessary on the coefficient on y_{SS} in (A2.6).

(b) From equation (2.13) and appendix equation (A2.3)

$$Y_S - g = d_2(X - f)^3 \qquad \text{(A2.7)}$$

and

$$Y_{SS} - m = e_2(X - \ell)^3 \qquad \text{(A2.8)}$$

Letting $\ell = f$, solving (A2.7) and (A2.8) simultaneously gives

$$Y_S - g = (d_2/e_2)(Y_{SS} - m) \qquad \text{(A2.9)}$$

Also, since m and g are both constants then $m = g + k$ is also a constant, and therefore

$$Y_S - m + k = (d_2/e_2)(Y_{SS} - m) \qquad \text{(A2.10)}$$

i.e.

$$y'_S = -k + (d_2/e_2)y'_{SS} \qquad \text{(A2.11)}$$

Substituting (A2.11) into (A2.5) gives

$$y'_I = \eta_6 - \eta_7\{1/(y'^{1/3}_{SS} + \lambda)\} - \eta_8 y'_{SS} \qquad \text{(A2.12)}$$

where $\eta_6 = \eta_4 + k$, $\eta_7 = \eta_5$, and $\eta_8 = d_2/e_2$

APPENDIX 2.3: PERCENTAGE SHARE OF ECONOMICALLY ACTIVE POPULATION 1960 and 1970

	Agriculture		Services		Community, Social & Personal Services		Manufacturing	
	1960	1970	1960	1970	1960	1970	1960	1970
1. Egypt+	54.0	48.9	28.7	33.0	17.8	19.1	10.0	11.1
2. Sudan 1956	85.8	-	7.3	-	4.6	-	5.0	-
3. Tunisia	68.1	60.1	13.1	23.1	6.4	14.2(*)	6.2	11.2
4. Argentina	17.8	14.8	39.9	46.0	20.6	23.2	25.1	19.7
5. Brazil	51.6	44.3	23.6	35.4	12.1	22.0	8.9	11.0
6. Mexico	54.2	39.5	26.2	31.8	13.5	19.8(†)	13.7	16.7
7. Peru	49.7	40.6	27.3	33.6	15.3	17.5	13.2	12.7
8. U.S.A. 1960; 1971	6.5	4.2	51.7	62.5	24.8	30.2	26.5	24.1
9. India 1961; 1971	72.9	72.0	14.5	15.8	8.8	7.8	9.5	9.5
10. Iran, 1956; 1966	54.8	41.8	20.1	22.5	10.8	12.2(*)	13.5	16.7
11. Iraq 1957	47.9	-	24.3	-	14.2	-	9.5	-
12. Pakistan 1961; 1971	75.0	58.0	14.7	22.6	8.1	6.9	8.1	14.3
13. Phillipines	60.5	51.4	19.0	26.9	10.7	14.8(*)	9.8	11.4
14. Syria	46.6	49.0	23.1	27.0	12.1	13.3	10.7	11.9
15. Austria 1961; 1971	22.8	13.8	35.1	42.4	18.3	16.5	28.6	31.3
16. Belgium 1961; 1970	7.2	4.5	43.0	48.1	21.4	20.6	34.7	32.0
17. Denmark	17.5	10.6	44.3	50.8	22.1	24.2	28.5	25.9
18. France 1962; 1968	19.8	15.1	38.7	44.5	20.1	20.1	26.9	25.8
19. W. Germany 1961; 1970	13.4	7.5	37.9	44.2	18.9	18.9	36.4	37.9
20. Greece 1961; 1971	53.3	40.6	23.6	30.9	12.1	10.8	13.4	17.1
21. Italy 1961; 1971	28.3	16.4	29.5	36.5	13.5	17.4	26.5	31.2
22. Norway	19.5	11.6	43.6	50.9	18.4	20.3	25.5	26.8
23. Portugal	42.3	29.6	26.2	31.5	14.6	14.4	20.3	21.7
24. Spain	41.3	24.8	26.3	36.4	13.9	15.7	21.9	25.5
25. Sweden	13.8	8.1	40.8	51.4	19.8	24.8	34.2	29.1
26. Switzerland	11.2	7.7	38.2	43.9	19.0	15.4	39.5	37.7
27. Turkey	75.0	68.9	10.2	18.8	5.2	10.6	6.8	8.0
28. U.K. 1961; 1971	3.8	2.5	46.9	49.4	24.4	22.8	34.8	32.6
29. Yugoslavia 1961; 1971	56.9	44.6	14.9	19.9	8.7	10.6(*)	11.9	17.7
30. Australia 1961; 1971	10.9	7.2	47.8	53.3	19.6	18.8	27.0	22.9
31. New Zealand 1961; 1971	14.4	11.5	48.5	52.1	20.3	19.4	25.0	25.1

Notes to Appendix 2.3 on following page.

Notes to Appendix 2.3

+ Data for Egypt are for 'employment', and have been omitted from all regressions.

* 'Services' excluding 'Transport and Communications', 'Finance', 'Retail and Wholesale Trade'. In Yugoslavia, 'Finance' is included.

† Includes 'gas, water, storage and sanitary services'.

Source: I.L.O., Yearbook of Labour Statistics, Geneva (various issues).

CHAPTER 3

INTERNATIONAL COMPARISONS OF THE EFFECTS OF NON-MARKET SECTOR GROWTH

3.1 INTRODUCTION

The relative merits of private versus public production within a mixed economy have always been, and continue to be, an important subject of discussion in economics. Private and public sectors have been analysed and compared in terms of their efficiency, the type and desirability of the goods they produce, and the effects of their ownership structure. In recent years, the inter-relationship between private and public sectors has been of considerable interest both to politicians and economists. The election of the Thatcher administration in the U.K. and the Reagan administration in the U.S.A. was associated with strong arguments in favour of a diminishing role for the public sector, and a rise in private production which is alleged to be necessary to combat the macroeconomic ills of inflation, unemployment and slow productivity growth.

Economists have often tried to explain macroeconomic problems using a structural approach involving private and public sectors. Perhaps the best known attempt is Baumol (1967), who developed a model showing that productivity differences between a 'progressive' and a 'non-progressive' sector can cause problems of cost-inflation and slow growth. These two sectors were assumed to consist respectively of, mainly private, manufacturing activities and, mainly public, service activities. More recently Johnston (1975) suggested an alternative division of economic activity could best aid an understanding of inflation. Johnston argued that the distinction between sectors producing 'marketed' outputs and those producing 'non-marketed' outputs was more useful than a private/public division. This distinction was taken up by Bacon and Eltis (1976) who argued that growth in the non-market sector in the U.K. was partly responsible for the U.K.'s slow growth in marketed output, high inflation rates

and balance of payments problems. It is with the Bacon and Eltis approach that this chapter is most concerned.

The Bacon and Eltis analysis has been applied to non-market sector growth in several countries. These have included studies of the U.S.A., Canada, Egypt and Greece.[1] In each case, it has been argued that expansion of the non-market sector at the expense of the market sector can have adverse macroeconomic effects. To date, however, there has been no consideration of how these effects may best be compared across countries.

This chapter provides a framework in which international comparisons of the macroeconomic implications of different market and non-market growth rates can be identified. In Section 3.2 market and non-market sectors are defined and the relationship between employment growth and the growth of market sector output is discussed. Section 3.3 then presents a framework for making international comparisons, which in Section 3.4 is applied to cross-section data for 27 developed and less developed countries in 1960 and 1970. The results of this investigation are summarised in Section 3.5.

3.2 MARKET AND NON-MARKET SECTORS

The market sector of an economy may be defined following Johnston (1975), as all sectors producing outputs sold 'in the market-place', including agricultural and industrial goods, and services such as banking and insurance.[2] The non-market sector represents those outputs provided 'free' and is therefore usually wholly publicly owned.[3] Alternatively non-marketed outputs may be defined as those outputs for which there is no charge directly related to the amount consumed, such as state-provided education, defense, etc.

The relationship between marketed and non-marketed outputs may

be easily derived from the familiar national income identity.

$$Y \equiv C + I + G + X - M \tag{3.1}$$

This can be divided into marketed and non-marketed outputs such that

$$Y \equiv Y_m + Y_g \equiv C_m + I_m + G_m + (X - M) + G_g \tag{3.2}$$

that is, total output or income (Y) consists of marketed goods and services (Y_m) plus non-marketed outputs (Y_g). These non-measurable outputs are usually estimated using wages and salaries of public, non-market sector employees. Marketed output is purchased by market sector firms and workers for consumption and investment ($C_m + I_m$), by foreigners in the form of exports and by Public Authorities and their employees, (the non-market sector), (G_m).[4] Public Authorities also use non-marketed outputs measured by the amount of wages and salaries paid to their employees, (G_g).

Thus, since $Y_g \equiv G_g$

$$Y_m \equiv C_m + I_m + G_m + X - M \tag{3.3}$$

$$\equiv C_m + I_m + G_m + B \tag{3.4}$$

where B is the current account surplus on the balance of payments. This is similar to the identity used by Bacon and Eltis. However, they define marketed output in terms of final outputs so that

$$O_m \equiv C_m + I_m + C_u + I_u + X \tag{3.5}$$

where O_m is total final sales of domestically produced goods and services plus final use imports and $C_u + I_u$ is equivalent to G_m in equation (3.3).[5] Using the definitions in equation (3,4) allows marketed output to be

estimated using annual data on value added. This avoids the need to extrapolate between years when input-output tables are available to gain annual estimates of final expenditures necessary to estimate equation (3.5). In many less developed countries the accuracy of such tables is in any case extremely dubious.

From (3.4), since G_m includes investment goods (I_u) and consumption goods (C_u), (3.4) may be rewritten as

$$Y_m \equiv C_m + C_u + I + B \tag{3.6}$$

Differentiating (3.6) with respect to time and dividing throughout by Y_m, gives

$$\dot{Y}_m = \alpha_t \dot{C} + \beta_t C_u + \gamma_t \dot{I} + \partial_t \dot{B} \tag{3.7}$$

where α_t, β_t, γ_t and ∂_t represent the respective instantaneous shares of C_m, C_u, I and B in marketed output, Y_m, and where $\dot{Y}_m$, $\dot{C}_m$, $\dot{C}_u$, $\dot{I}$ and $\dot{B}$ represent the rates of change in each of the variables.

In addition it can be shown that the rate of growth of consumption in each sector is equal to the sum of the rates of growth of consumption per employee in each sector, $\dot{c}_m$ and $\dot{c}_u$, and the rates of employment growth in each sector, $\dot{E}_m$ and $\dot{E}_u$. This implies that faster employment growth can only be achieved at the cost of slower growth in consumption per employee, if total consumption growth is to remain constant. Equation (3.7) may therefore be rewritten as (omitting time subscripts)

$$\dot{Y}_m = \alpha(\dot{c}_m + \dot{E}_m) + \beta(\dot{c}_u + \dot{E}_u) + \gamma\dot{I} + \partial\dot{B} \tag{3.8}$$

The growth of marketed output is now expressed as a weighted average of the growth in consumption and employment in both sectors, investment and the balance of payments. Equation (3.8) shows that, for a given value of $\dot{Y}_m$,

faster employment growth in either sector must reduce the growth in consumption per employee, if $\dot{C}$ is to remain constant. If this does not occur and consumption growth increases, investment and net export growth will be limited. Of course if sector employment growth rates tend to compensate for each other, (as for example when, with a constant labour force, reallocation takes place between sectors) this will allow increased growth of consumption per employee in both sectors without raising the overall growth of consumption. The extent of this increase will be dependent on the relative size of employment in both sectors, the size of the labour transfer, and both sectors' propensities to consume.

Notice that (3.8) is an ex post equation and does not attempt to identify causality. It is not possible to say a priori whether or not a change in one of the variables on the right-hand side of (3.8) will lead to a change in $\dot{Y}_m$ via multiplier effects or to an opposite change in one or more of the remaining right-hand side variables (though on a full employment growth path the latter is more likely). However equation (3.8) does permit ex post consideration of the effects on the right-hand side variables of one or more of them growing faster than marketed output. It may be argued, for example, that allowing non-market employment to grow faster than marketed output will have multiplier effects and thus eventually raise marketed output growth. Nevertheless, as long as $\dot{E}_u$ exceeds $\dot{Y}_m$ other variables in (3.8), (which also have associated multiplier effects) will be reduced.

To examine the implications of different employment growth rates in the market and non-market sectors relative to marketed output, it is helpful to rearrange equation (3.8) to give

$$\dot{Y}_m - (\alpha\dot{E}_m + \beta\dot{E}_u) = \alpha\dot{c}_m + \beta\dot{c}_u + \gamma\dot{I} + \partial\dot{B} \qquad (3.9)$$

Since $\alpha\dot{E}_m + \beta\dot{E}_u$ is the growth in consumption as a result of employment

expansion in either sector, equation (3.9) shows that growth in consumption per employee, investment growth and net export growth are limited in the aggregate to the difference between marketed output growth and the growth in consumption arising from increased employment. Thus countries that experience faster expansion of market and/or non-market employment relative to $\dot{Y}_m$, must also experience reduced consumption growth of marketed output by the existing labour force, and/or investment, and/or a worsening balance of payments.

Equation (3.9) also indicates that in countries experiencing rapid population growth where employment creating policies (in either sector) are often adopted to minimise unemployment, adverse macroeconomic consequences will occur if marketed output growth is not simultaneously raised. However for countries which increase non-market employment growth, rather than adopt policies to encourage faster market employment growth, simultaneous and commensurate increases in $\dot{Y}_m$ may be less likely. As Bacon and Eltis (1976) have emphasised, in the short run increases in the growth of market employment can be expected, via the production function relationship, to increase $\dot{Y}_m$ whereas increases in non-market employment growth will only change $\dot{Y}_m$ to the extent of the net multiplier effects. Of course, if non-marketed outputs are inputs to the market sector, expansion of the non-market sector may enable marketed output growth to increase. In some less developed countries where a large proportion of the market sector is publicly controlled, it is tempting for governments to expand market employment beyond that dictated by the production function, so that $\dot{Y}_m$ will not necessarily increase with $\dot{E}_m$.[6]

Finally it has been argued in much of the literature on the choice of criteria for investment allocation, that social welfare functions should include effects on consumption, the balance of payments, and income distribution.[7]

Equation (3.9) shows that government decisions about employment in the non-market sector also have important implications for social welfare via the balance of payments and consumption. But even if employment creation enters the social welfare function independently, (3.9) shows the trade-off between employment growth and other variables in the equation.

3.3 CROSS-COUNTRY COMPARISONS

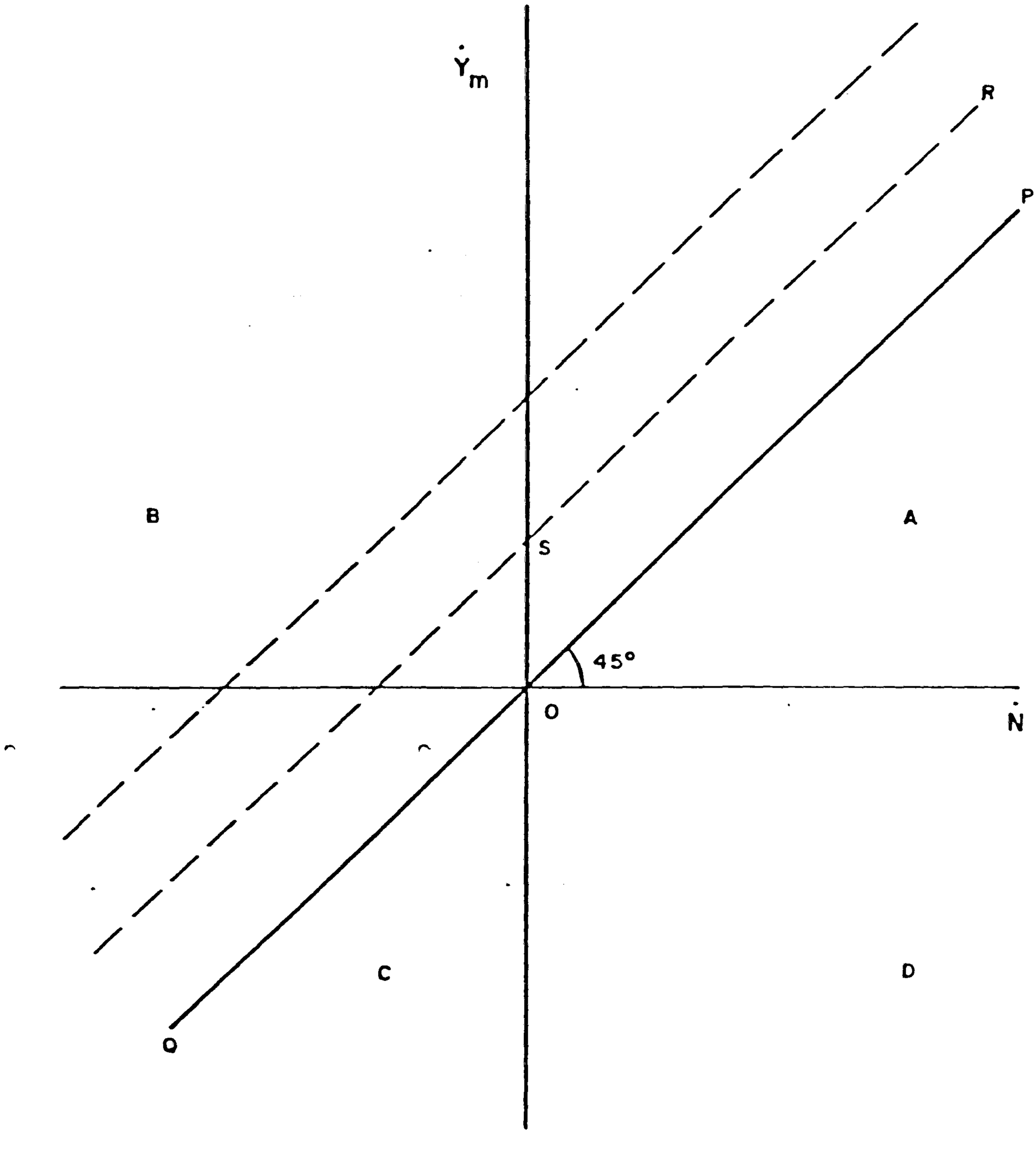
It was shown in equation (3.9) that the difference between the two left-hand side variables, $\dot{Y}_m$ and $(\alpha\dot{E}_m + \beta\dot{E}_u)$ is equal to the sum of the growth in consumption per employee, investment and net exports, all of which are frequent policy goals of governments. It is interesting therefore to assess how this constraint varies for different countries. This may be done by considering differences in $\dot{Y}_m$ and $(\alpha\dot{E}_m + \beta\dot{E}_u)$ which can be shown diagrammatically, as in Figure 3.1 where $\dot{N} = \alpha\dot{E}_m + \beta\dot{E}_u$.

In quadrant A, OP indicates points of equality between $\dot{Y}_m$ and $\dot{N}$, i.e. positive values for any variable on the right-hand side of (3.9) must be balanced by similar negative values among the other right-hand side variables. Clearly the difference beteen $\dot{Y}_m$ and $\dot{N}$ will be constant along lines parallel to OP, such as RS, and $\dot{Y}_m - \dot{N}$ is greater on lines further from OP in a north-westerly direction. ($\dot{Y}_m - \dot{N}$ will of course be negative for points below OP). These parallel lines may be referred to as 'isodifferential lines'. Thus countries on the same isodifferential line experience the same overall constraint on the growth of consumption per employee, investment and net exports. For countries seeking to maximise these variables' values, a position on an isodifferential line furthest from OP in a north-westerly direction is to be preferred.

Although most countries may be expected to be in quadrant A, where

FIGURE 3.1

GROWTH IN MARKETED OUTPUT AND MARKET AND NON-MARKET SECTOR EMPLOYMENT



both variables are positive, observations are also likely in quadrant B. In this quadrant marketed output growth is positive but weighted employment growth, $\dot{N}$, is negative, allowing a larger differential for each value of $\dot{Y}_m$ than in quadrant A. In fact isodiffential lines in quadrant A can be extended through quadrants B and C, and points above PQ in Figure 3.1 will experience increasing values of $(\dot{Y}_m - \dot{N})$.[8]

Finally it is interesting to compare the growth in marketed output, not only with a weighted rate of growth of total employment, but also with the non-market employment growth component, $\beta\dot{E}_u$, since it has been argued that non-market employment growth in particular can have adverse effects. This can be done in exactly the same manner as that discussed above by considering the differential $\dot{Y}_m - \beta\dot{E}_u$. Larger values of $\dot{Y}_m - \beta\dot{E}_u$ enable growth in consumption per employee, investment, net exports and market sector employment to increase. This comparison identifies those countries which have primarily expanded non-market sector employment, relative to marketed output.

3.4 SOME INTERNATIONAL EVIDENCE

In this section the framework outlined in Section 3.3 is applied to evidence from a sample of 27 countries (14 developed and 13 less developed). The purpose of the evidence considered here is to provide a broad indication of various countries' relative positions which can be gained using available data.

Employment and output data, disaggregated into market and non-market sectors are of course not readily available. Estimating these categories therefore involves two, often conflicting, objectives - maximising accuracy within a country's data and maximising consistency across countries' data. Having defined the market sector, estimating marketed

TABLE 3.1 EMPLOYMENT AND OUTPUT GROWTH IN 27 COUNTRIES, 1960-1970

	Av. Annual Growth in Economically Active Population and Marketed Output					
	Social Services	Market Sector				
	$(\dot{E}_u)$	$(\dot{E}_m)$	$(\dot{Y}_m)$	α	β	$(\alpha\dot{E}_m + \beta\dot{E}_u)$
1. Egypt+(a)	4.0	3.1	4.4	.68	.18	2.8
2. Tunisia+(a)	6.1	2.1	6.9	.64	.19	2.5
3. Argentina+	3.3	1.5	4.6	.70	.09	1.3
4. Brazil+	9.1	1.2	7.6	.69	.15	2.2
5. Canada	5.2	2.3	5.8	.64	.14	2.2
6. Mexico+	5.0	-0.1	6.4	.81	.05	0.2
7. Peru+	3.1	1.1	5.0	.68	.08	1.0
8. U.S.A. (1960-71)	3.9	1.7	4.0	.64	.18	1.8
9. India+(b)	-1.5	-0.3	3.7	.44	.20	-0.4
10. Iran+	3.6	1.3	8.9	.70	.10	1.3
11. Philippines+	7.8	3.4	5.6	.82	.09	3.5
12. Syria+	4.3	4.5	5.8	.74	.14	3.9
13. Austria (b)	-1.5	-0.7	5.1	.59	.13	-0.6
14. Belgium	0.0	0.3	5.0	.70	.13	0.2
15. Denmark	1.9	0.6	4.7	.66	.13	0.6
16. France	0.8	0.5	6.1	.65	.14	0.4
17. W. Germany	0.0	-0.1	5.0	.57	.14	-0.1
18. Greece+(b)	-1.9	-0.8	8.0	.75	.11	-0.8
19. Italy	3.4	-0.9	5.9	.64	.12	-0.2
20. Norway	1.3	0.2	4.8	.58	.14	0.3
21. Portugal	-0.2	-0.8	6.3	.77	.11	-0.6
22. Spain	1.5	0.0	8.3	.72	.09	0.1
23. Sweden	2.8	-0.1	4.0	.60	.17	0.4
24. Turkey+	9.5	2.6	5.8	.75	.13	3.1
25. U.K. (a)	2.2	-0.2	2.9	.66	.17	0.2
26. Yugoslavia+(b)	2.4	0.2	6.6	.52	.14	0.4
27. Australia (b)	1.9	2.0	5.7	.65	.10	1.5

(a) Employment growth rates

(b) Rates of growth over the period, 1961-71

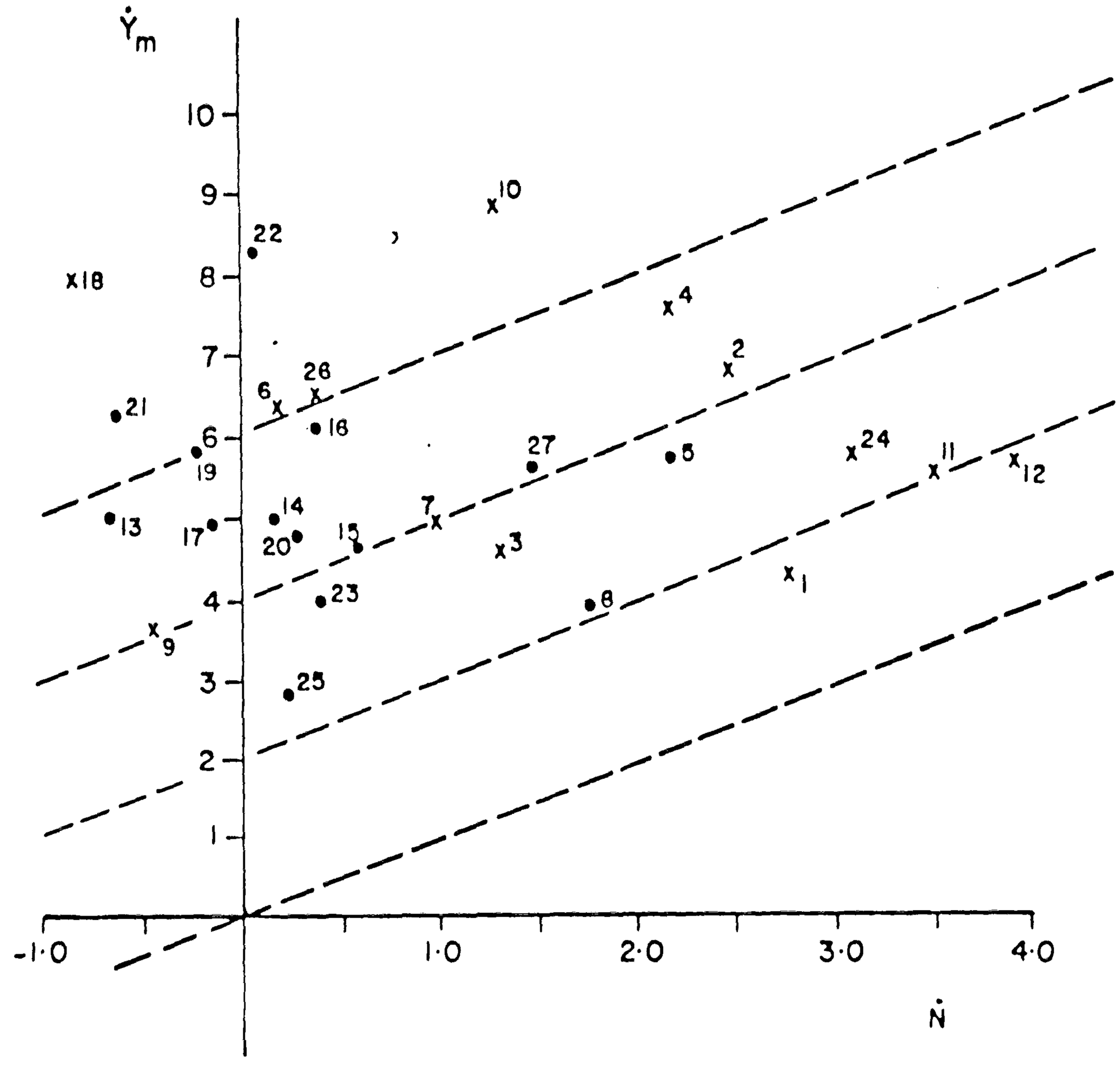
\+ Indicates less developed country (LDC). An LDC is defined here as a country having 40% or more of its economically active population in agriculture in 1960.

output is not difficult and can be obtained from national accounts using the identity in (3.6). Estimating market and non-market employment is more difficult since even a private/public division is not readily available in many LDCs, (though it is usually available in output and expenditure data). In addition, because of substantial public ownership of the market sector in many LDCs, a public/private distinction is often not very useful. Non-market sector employment has therefore been estimated from the ISIC classification of 'community, social and personal services', using International Labour Office (I.L.O.) statistics.[9] In most countries these services are substantially publicly-owned and non-marketed, though in most cases a small proportion of these services, such as domestic service, are private and marketed. Possible inaccuracies arising from this classification of the data have been examined for some countries where more detailed data are available. This suggests that the results in Table 3.1 are a reasonable approximation.[10] In addition, as will be shown later, the results of this study are in broad agreement with individual country studies which have used more detailed data.

In order to maximise consistency, the data in Table 3.1 have been taken from the same I.L.O. source and each is based on census data which, particularly in LDCs, have greater coverage and are more accurate than labour force sample surveys. The shares of market and non-market consumption in marketed output, α and β respectively, have been estimated from the shares of public and private consumption in GDP in 1960[11] for each country, as published in national accounts. Using the data from Table 3.1, Figures 3.2 and 3.3 show the comparisons of $\dot{Y}_m$ with $\dot{N}$ and $\beta\dot{E}_u$ respectively.

Figure 3.2 provides some interesting observations. First, those countries furthest from the origin are predominantly LDCs, suggesting that they have experienced higher rates of marketed output growth and/or market and non-market employment over the period, which is what may be

FIGURE 3.2 GROWTH IN MARKETED OUTPUT AND MARKET AND NON-MARKET SECTOR EMPLOYMENT IN 27 COUNTRIES (1960-70)



Note: L.D.C.s are plotted using crosses to aid identification

expected. It is also clear from Figure 3.2 that this has not necessarily meant larger values of $(\dot{Y}_m - \dot{N})$ in these LDCs. The isodifferential lines indicate that developed and less developed countries are similarly spread, with no obvious tendency for either group to exhibit better or worse performance (in terms of the size of $\dot{Y}_m - \dot{N}$) as a whole.

Secondly, many countries, particularly the more developed, are clustered round the $\dot{Y}_m$ axis (in both quadrants A and B), which arises because a negative weighted rate of growth of market sector employment $(\alpha\dot{E}_m)$ is being counteracted by a positive weighted rate of non-market employment growth, $(\beta\dot{E}_u)$. Thus, in West Germany (number 17 in Table 3.1) and Spain (22), for example, almost none of the fairly high rates of marketed output growth is being taken up in employment growth. The same is true of the U.K. (25) but with a much lower rate of marketed output growth, and its poor performance relative to other developed countries is evident in Figure 3.2, showing that only the U.S.A. (8) in this sample, has a similar differential.

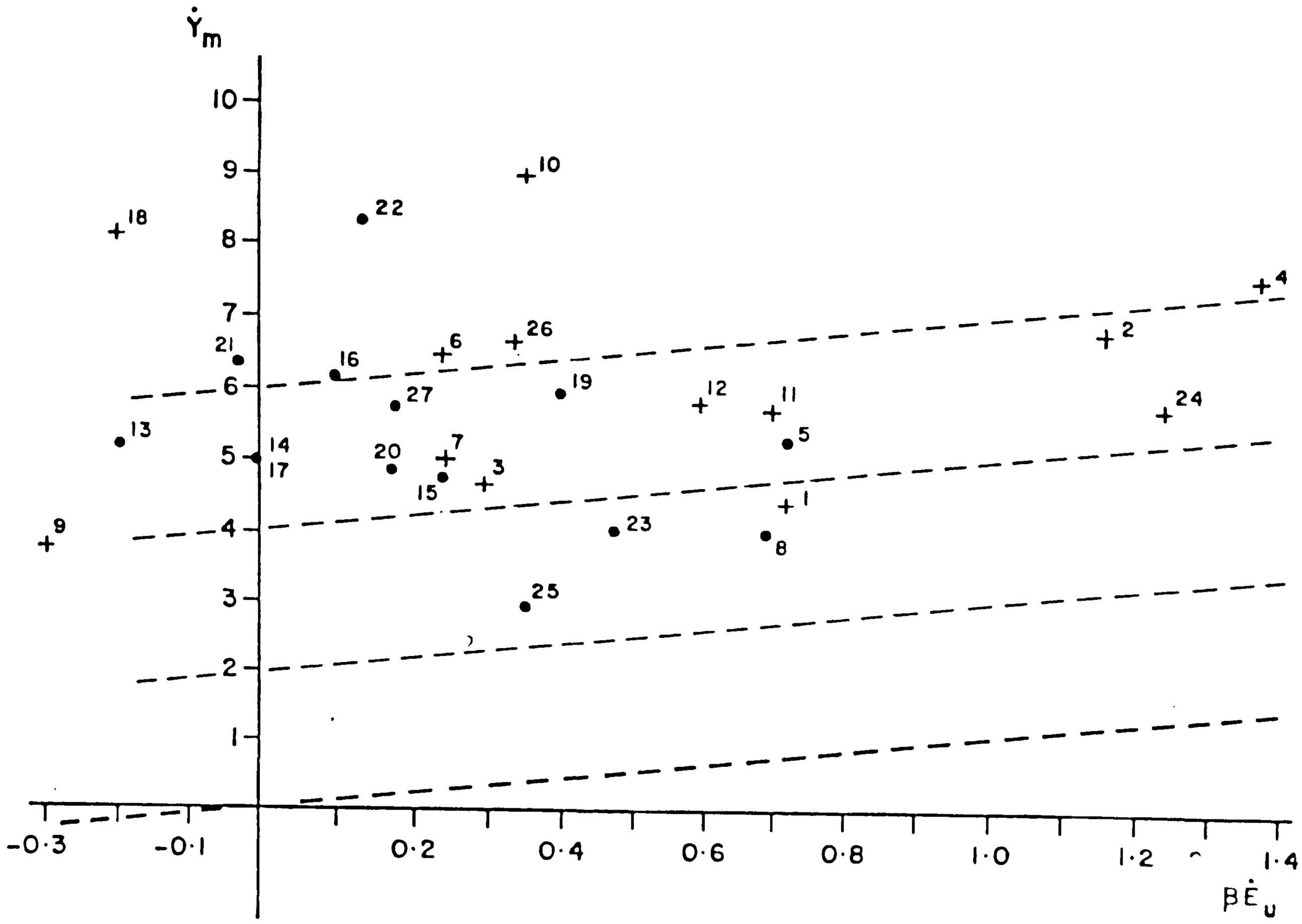
Finally, in Figure 3.2, the worst performers in terms of total marketed output available to increase consumption, investment and the balance of payments position appear to be Egypt (1), Philippines (11), and Syria (12), while Iran (10), Spain (22) and Greece (18) show particularly healthy performances.

The relationship between marketed output growth and consumption growth due to increasing non-market employment $(\beta\dot{E}_u)$ is illustrated in Figure 3.3 providing three further points of interest. First, the general pattern that emerges is that different countries' relative positions are broadly similar to those in Figure 3.2. The best and worst performers tend to be the same in both cases.

Secondly, there is a greater relative dispersion of $\beta\dot{E}_u$ values than $\dot{N}$ values, implying that there is greater variability between countries in

FIGURE 3.3

GROWTH IN MARKETED OUTPUT AND NON-MARKET EMPLOYMENT IN 27 COUNTRIES (1960-70)



the consumption growth due to non-market employment expansion. Thus Tunisia (2), Brazil (4) and Turkey (24) have experienced much higher values of $\beta\dot{E}_u$ than the rest of the sample, though high rates of marketed output growth keep them on higher isodifferential lines.

Thirdly, some countries show relative movements between isodifferential lines when compared to Figure 3.2. Sweden (23) for example clearly becomes one of the worst performers when only non-market employment is considered and the U.K. is on the lowest isodifferential line of all countries in the sample. Table 3.1 confirms that both Sweden and the U.K. have high proportions of marketed output devoted to non-market consumption, (particularly when compared to other developed countries), and that in both countries non-market employment grew much faster than market employment. The U.S.A. also appears to have a high weighted rate of non-market employment growth relative to marketed output and evidence on the U.S.A. by Bacon and Eltis (1978) confirms that America has suffered macroeconomic problems similar to those of the U.K. Because many social services in the U.S.A. are privately produced however, the observation in Figure 3.3 may be thought to be biased downwards relative to other countries. Comparing growth rates of government and non-government employment in the U.S.A. over this period however gives similar results to those obtained in Table 3.1.

Syria (12) shows an interesting movement in the opposite direction to Sweden. Having had one of the lowest $\dot{Y}_m - \dot{N}$ differentials in Figure 3.2, it becomes a fairly typical performer in Figure 3.3. This suggests that the low differential in Figure 3.2 is mainly due to <u>market</u> employment growth. In fact Syria may be an example where expansion of the market sector has been a result of over-zealous employment creating policies as discussed in Section 3.2.

These observations are in general agreement with the more detailed

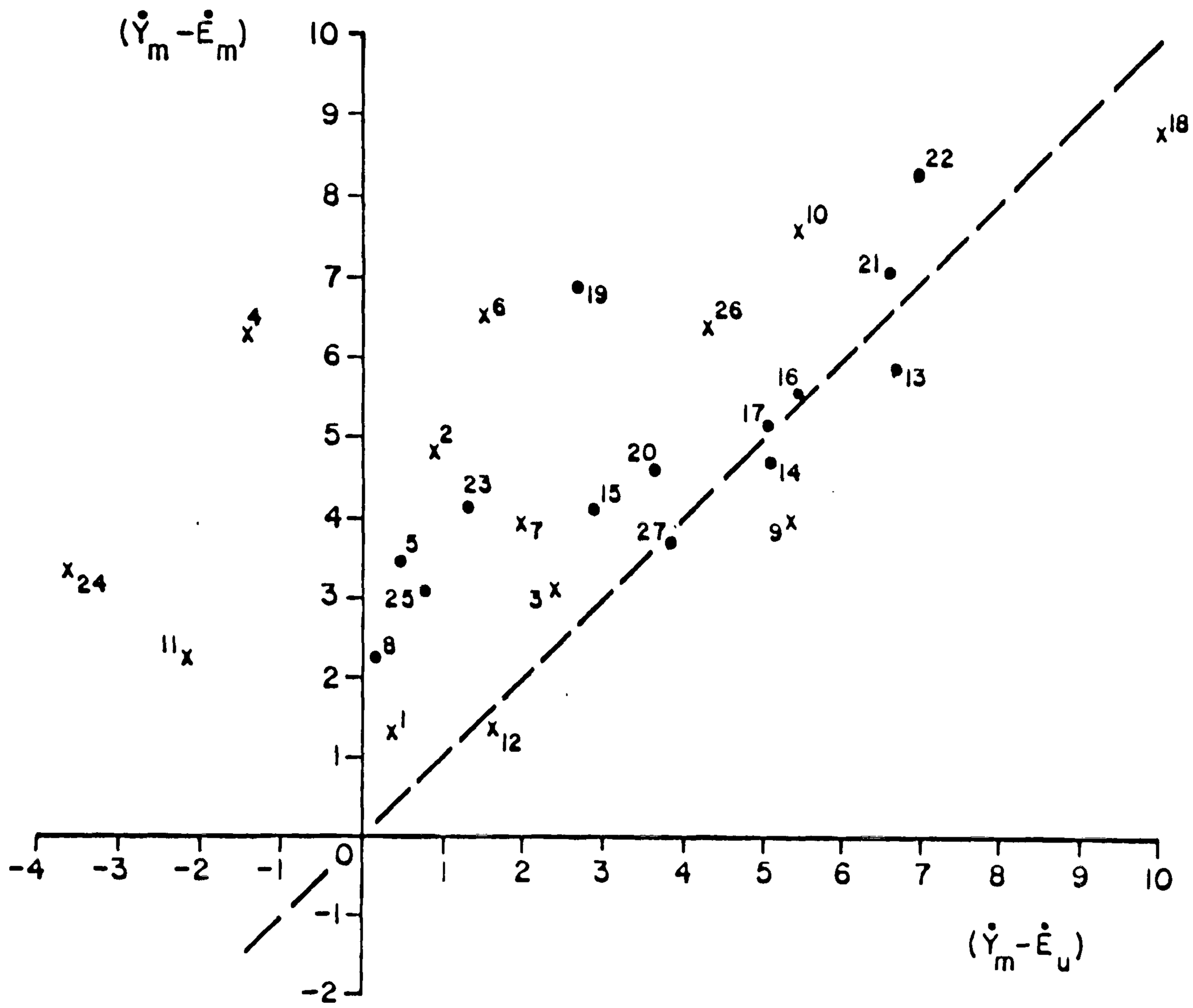
studies conducted to date. Bacon and Eltis (1978) found that the U.S.A. and Canada have both suffered problems similar to those of the U.K., though to a lesser extent, and this is confirmed by Figures 3.2 and 3.3. Gemmell (1982) (see chapter 9) argued that the Egyptian economy suffered severe macroeconomic problems due to excessive non-market sector growth, during 1960-76, and Figures 2.3 and 3.3 also confirm this. For Greece, Bacon and Karayiannis-Bacon (1980) found that growth was very rapid over the period 1958-74, with real consumption rising by more than 5% per annum, along with steady growth in investment. However, their analysis suggests that the healthy position of the economy between 1960 and 1970, shown in Figures 3.2 and 3.3, may not have continued into the middle to late 'seventies.

Finally, the relative effects of market and non-market employment growth (which cannot be distinguished in Figure 3.2 and are weighted by the consumption proportion β in Figure 3.3) can be assessed by considering the growth rate differentials $(\dot{Y}_m - \dot{E}_m)$ and $(\dot{Y}_m - \dot{E}_u)$. These are shown in Figure 3.4. $(\dot{Y}_m - \dot{E}_m)$ is equivalent to market sector productivity growth[12] so that Figure 3.4 shows the association between market sector productivity growth and non-market employment growth. Larger values of $(\dot{Y}_m - \dot{E}_m)$, i.e. faster market-sector productivity growth, imply faster consumption and investment growth and/or improvement in the balance of payments.

Points furthest from the origin in Figure 3.4 are experiencing fastest market sector productivity growth and slowest non-market employment growth (relative to marketed output growth). Countries identified in Figure 3.2 as exhibiting the healthiest overall performance are evident here - Iran (10), Greece (18), and Spain (22). For points closest to the vertical axis, market sector productivity growth is associated with faster non-market employment growth, so that for countries

FIGURE 3.4

DIFFERENTIAL GROWTH RATES BETWEEN MARKETED OUTPUT AND EMPLOYMENT IN THE MARKET AND NON-MARKET SECTORS IN 27 COUNTRIES (1960-70)



such as Mexico (6) and Italy (19) the relatively low values of $\dot{Y}_m - \dot{E}_u$ are not as problematic as for countries such as Egypt (1) or Canada (5), because they have simultaneously achieved relatively high rates of productivity growth in the market sector.

For points to the left of the 45^o line in Figure 3.4, $\dot{E}_u > \dot{E}_m$ and, perhaps surprisingly, it can be seen that most developed and less developed countries were in this position 1960-70. Indeed perhaps the most interesting feature of the diagram is that in all but four of the 13 LDCs in the sample,[13] marketed output growth exceeds non-market employment growth by only 3% or less, ($\dot{Y}_m - \dot{E}_u \leqslant 3\%$), and in three cases $\dot{E}_u > \dot{Y}_m$. This means that in most LDCs, improvements in market sector productivity were, in general, associated with faster non-market employment growth than in the developed countries. This can be explained by the rapid expansion in social expenditure programmes (mainly health, defence and education) in many LDCs in recent years. It serves to put the recent literature on the growth of non-market sectors in some developed countries in perspective.

3.5 SUMMARY AND CONCLUSIONS

This chapter has attempted to provide a method of comparing some implications of expansion in an economy's non-market sector across countries. Section 3.2 discussed the relationship between marketed output and employment growth in the two sectors, which enabled a framework to be set up in Section 3.3 allowing simple comparisons of the relationship between increasing market and non-market employment and overall macroeconomic performance to be made across countries. In particular, consequences for the growth of per capita consumption, investment and the balance of payments, can be identified. For countries

experiencing slow growth in investment or net exports for example this analysis can readily show the extent to which this is associated with expansion of the non-market sector, and how this compares with other countries.

It is not suggested that non-market sector expansion per se is necessarily harmful. Rather it is intended to emphasise some macro-economic implications of the non-market sector growing faster than marketed output, so that governments can assess the alternative effects on social welfare. It may be noted, for example, that for governments who consider employment growth as a worthwhile policy goal in its own right, expansion of the non-market sector may have greater adverse repercussions on the growth of other variables, than increasing market sector employment.

Section 3.4 examined the relative positions of a sample of 27 developed and less developed countries, for 1960-70, and found that for countries such as Egypt, Philippines and Syria, the growth of consumption, investment and the balance of payments was severely limited, without similar limits to employment growth, especially in the non-market sector. Of the developed countries, the U.K. probably experienced the most severe constraints.

Footnotes

1. See Bacon and Eltis (1978), Bacon and Karayiannis-Bacon (1980), and Gemmell (1982). A revised version of the Egyptian study is presented in chapter 9.

2. Market and non-market sector definitions are discussed in more detail in Bacon and Eltis (1978). It may be noted that the definition of the non-market sector closely resembles the Niskanen (1971) definition of bureaus. Niskanen has defined bureaus as 'non-profit organisations which are financed, at least in part, by a periodic appropriation or grant' (p.15). The non-market sector may be considered as only that part which is financed in this way.

3. It is perhaps unfortunate, in the context of LDCs, that those labels, which were first used when analysing developed countries (see Johnston (1975), Bacon and Eltis (1976)), have been adopted. The non-marketed sector in LDCs is often taken to mean that proportion of output, usually agricultural, which never reaches the market place, and therefore does not enter the money economy, because it is either consumed by the producer or traded in the barter economy. However, to avoid further proliferation of classifications of economic activity, the terms marketed and non-marketed will be used as defined in the text.

4. G_m therefore includes consumption out of wages received by non-market sector employees, transfers, debt interest and direct purchases of final consumption and investment goods by the non-market sector. This differs from the classifications used in most National Accounts which include all government investment with 'Gross Fixed Capital Formation'.

5. Since Y_m in equation (3.3) is value added in the market sector it is equivalent to total final sales (expenditure), O_m, less total imports.

6. In economies experiencing a transfer of labour from the market to the non-market sector in absolute terms there will of course be no change in total consumer demand assuming the same propensity to consume by both groups.

7. See Kahn (1951), Chenery (1953), Galenson and Leibenstein (1955) and Sen (1968). A summary of this literature is contained in Thirlwall (1978, pp.169-211).

8. Observations in quadrants C and D are less likely, at least in the longer term, with marketed output growth negative in both quadrants, and $\dot{N}$ negative in quadrant C.

9. All data are taken from various issues of the International Labour Office, Yearbook of Labour Statistics. For the non-market sector 1970 data are classified as 'community, social and personal' services using the 1968 ISIC, while 1960 data are classified, using the 1958 ISIC, simply as 'services'. This classification change was however only a change in name. In estimating $\dot{E}_u$ and $\dot{E}_m$ data on economically active population, rather than employment, have been used to allow a larger sample of LDCs to be taken.

10. In the U.S.A. and U.K. for example the annual growth rates of government and non-government employment (which approximate the market and non-market sectors fairly closely) were respectively 4.1% and 1.4% in the U.S.A. and 1.4% and -0.1% in the U.K. These yield values for $\dot{N}$ of 1.6% for the U.S.A. and 0.17% for the U.K. giving both countries similar relative positions to those shown in Table 3.1.

11. Since α and β are instantaneous shares, they should, ideally, be calculated for each year, 1960-70, along with actual annual growth rates. Also since GDP includes non-marketed outputs, this method will slightly underestimate α and β. However, the effect should be similar across countries so that inter-country comparisons will not be significantly affected.

12. Since $Y_m = P_m E_m$, when $P_m = Y_m/E_m$, then differentiating logarithmically with respect to time gives,

$$(dY_m/dt)/Y_m = (dP_m/dt)/P_m + (dE_m/dt)/E_m$$

or

$$\dot{Y}_m = \dot{P}_m + \dot{E}_m$$

13. The exceptions are India (9), Iran (10), Greece (18) and Yugoslavia (26).

CHAPTER 4

ECONOMIC GROWTH AND INCOME TAX REVENUE

4.1 INTRODUCTION

Examining the growth of the public sector must necessarily involve studying both the growth of public expenditures and the methods of financing those expenditures, of which taxation is frequently an important part. Both of these aspects have been prominent in attempts to understand and explain the changing role of the public sector during economic growth or development. On the expenditure side there is a long history of interest among economists in the growth of public expenditures. The early work of the German political economist Adolf Wagner (1883) continues to generate discussion, while the more recent contribution of Peacock and Wiseman (1961) has formed the basis of much subsequent research, especially in the U.K. The arguments of Bacon and Eltis (1976) concerning the growth of the non-market sector (which forms a part of the public sector) have also been widely discussed. Some developments from their approach were considered in chapter 3.

On the taxation side most interest has centred round the changing capacity to tax during development and in the composition of the tax structure at difference stages of development. Studies such as Martin and Lewis (1956), Williamson (1961), Hinrichs (1965, 1966) and Abizadeh and Wyckoff (1982) have typically used cross-section and/or time series data, often applying regression techniques, to identify changes in, for example, tax ratios as per capita income increases. The concern of this, and the next, chapter is <u>not</u> however with the 'appropriate' or 'typical' tax structure at different stages of development but with tax revenue changes for a <u>given</u> tax structure. The purpose of these two chapters is to consider how revenue from particular taxes and tax systems can be expected to vary as incomes increase. In this chapter revenue from

a progressive income tax is examined, while revenue from a system of direct and indirect taxes is examined in chapter 5.

The models developed in both chapters use simulated data to examine revenue growth but may be applied to a large number of countries which use similar taxes to those discussed. To enable comparisons with an actual tax system for which certain parameter estimates are available, the models are constructed to approximate the U.K. tax structure in particular. This need not however restrict the general applicability of the models since many aspects of the U.K. tax system are widely used.[1]

4.2 BUILT-IN FLEXIBILITY

It is well known that if personal income tax allowances are not indexed to allow for inflation, then a general increase in money incomes will increase tax revenue per person for two reasons. First, it increases taxable income as a proportion of total income for those already paying income tax, and secondly it brings more people into the tax 'net'. The precise extent of this increase, which has become known as the 'built-in flexibility' of the tax, depends of course on the way in which marginal tax rates increase as income increases, and on the distribution of before-tax income.

A variety of methods (based on regression techniques) have been used to examine the built-in flexibility of the U.K. tax system. A useful survey of these methods is provided by Dorrington (1974) who presents a comprehensive simulation analysis of the U.K. tax system. More recently, Hutton and Lambert (1980) have suggested a convenient method of calculating revenue elasticities for a system consisting of a sequence of fixed marginal tax rates and thresholds. Hutton and Lambert (1980a) have also proposed a model of the U.K.

tax system which is described as a 'linear-Pareto' model; since it has a fixed marginal rate applying to a large proportion of taxable income and a structure of higher marginal rates applying to top incomes which are assumed to follow the Pareto distribution.

While previous studies have usually estimated the built-in flexibility of a particular tax structure for specific years, the model presented in this chapter is capable of identifying some of the general properties of a progressive income tax system.[2] The model gives schedules of total revenue, effective marginal rates and revenue elasticities as income increases. This allows the effects of discretionary changes in the tax system at different average income levels to be isolated. A simple, but extremely flexible, tax function is used which is nevertheless capable of reproducing the essential features of many progressive tax systems in use. A non-linear tax schedule is used in conjunction with a lognormal distribution of pre-tax incomes (which covers the complete range of income) so that the model presented here may be described as a 'non-linear-lognormal' model. In addition to being flexible, the model has the advantages of tractability, and of being able to capture the main characteristics of actual systems with few parameters. These properties are particularly important where the model is to be integrated into a wider fiscal model, such as that presented in chapter 5.[3] Before examining the properties of alternative systems in Section 4.4, the main details of the model are described in Section 4.3

4.3 A SIMPLE TAX MODEL

4.3.1 The tax schedule

Consider the following income tax schedule, which uses a single value of 'personal' allowances applied to every individual.[4]

Denoting gross income as y, and total income tax as T(y), then in the absence of a negative income tax,

$$T(y) = 0 \qquad y < a_1$$

$$= t_1(y - a_1) \qquad a_1 < y < a_2$$

$$= t_1(a_2 - a_1) + (c - hy^{-k})(y - a_2) \qquad y > a_2 \qquad (4.1)$$

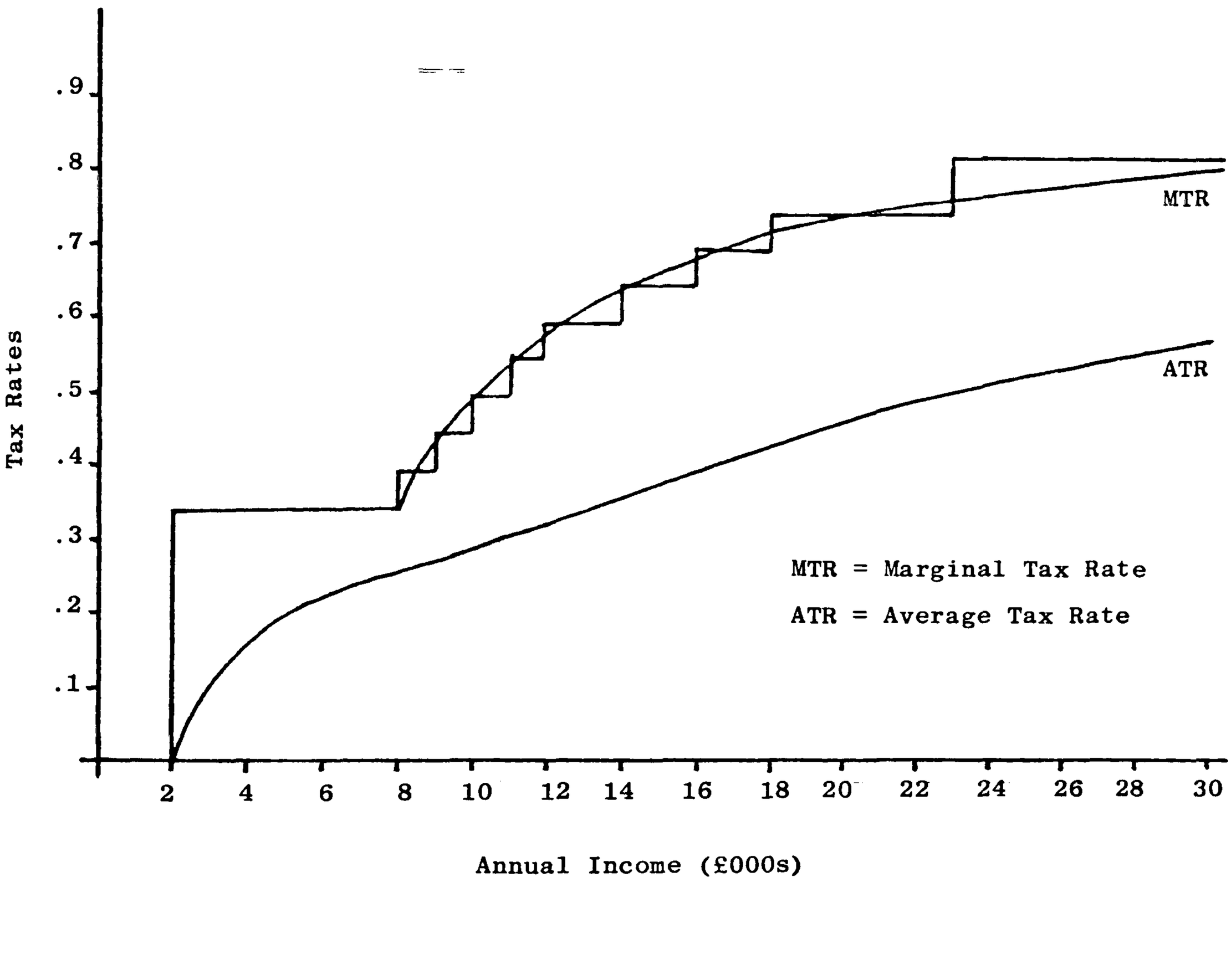
with $h = (c - t_1)a_2^k$ (4.2)

$k < 1$ (4.3)

A 'standard rate', t_1, is therefore applied to incomes between the thresholds a_1 and a_2. Thereafter marginal rates increase non-linearly.[5] The condition in (4.2) ensures that the marginal tax rate at the level, a_2, when individuals begin to pay higher marginal rates of income tax, is equal to t_1. The maximum rate is of course equal to c. The condition in (4.3) that $k < 1$ ensures that the tax schedule is progressive, that the marginal tax rate increases as gross income increases, and that the marginal rate exceeds the average rate.[6] An increase in k implies that marginal tax rates increase more rapidly from t_1 (at the threshold income a_2) to their maximum of c.

The tax schedule specified in (4.1) - (4.3) is therefore extremely flexible and is capable of describing a wide range of profiles of marginal and average tax rates. To give some idea of the extent to which the schedule in (4.1) can approximate the complex schedule actually used in the U.K., Figure 4.1 illustrates the situation for the financial year 1977/78. The parameter values used are as follows: $a_1 = 2000$, $a_2 = 8000$, $k = 0.66$, $t_1 = 0.34$ and $c = 0.95$ (whence $h = 229.8$).[7] Notice that it is necessary to use a value of c which is higher than the actual maximum marginal rate (of 0.83), since c is an asymptote and it is necessary to ensure that the profile has a marginal rate of .83 at appropriate income levels.

FIGURE 4.1 AVERAGE AND MARGINAL TAX RATES



The tax schedule can easily be fitted to any actual schedule of marginal tax rates, using ordinary least squares regression. Over the range $y > a_2$ the marginal rate, from equation (4.1), is given by

$$dT(y)/dy = c - (c - t_1)\left[(1 - k)(y/a_2)^{-k} + k(y/a_2)^{-1-k}\right] \qquad (4.4)$$

For a fixed k (and a_2, which is obtained directly) a regression of the form $z = \alpha + \beta x$, where x is the term in square brackets in (4.4), may be run. Results using different values of k may be compared to find that which gives the best fit.[8]

4.3.2 Total income tax revenue

If the distribution function of before-tax income is denoted by F(y), then total income tax revenue per person, R_t, is given as

$$R_t = \int T(y)dF(y) \qquad (4.5)$$

where integration is over the complete range of incomes $0 < y < \infty$.

When the tax schedule (4.1) to (4.3) is substituted into the general expression (4.5) it can be seen that a number of terms appear of the form $\int_a^{} y^r dF(y)$. Since by definition $\int y^r dF(y)$ is the r th moment about the origin, denoted μ'_r, the total revenue per head involves 'incomplete' moments (as integration is over a specified section of the income distribution). Simplification therefore requires the concept of the 'r th incomplete moment distribution' of y, denoted $F_r(y)$ and defined as[9]

$$F_r(y) = \int^y u^r dF(u) / \int u^r dF(u) \qquad (4.6)$$

After some manipulation it can be shown that

$$R_t = t_1 \{G(1, a_1) - G(1, a_2)\} + cG(1, a_2) - hG(1 - k, a_2) \qquad (4.7)$$

where in general the function G(r, y) is defined as

$$G(r, y) = \mu'_r\{1 - F_r(y)\} - y\mu'_{r-1}\{1 - F_{r-1}(y)\} \qquad (4.8)$$

Total income tax revenue per person is therefore a convenient function of just five parameters, c, a_1, a_2, t_1 and k, in addition to those

required to describe the moment distributions of the distribution of income.[10] The values of these parameters are available for many tax systems, and although, particularly in developed countries, there is often a variety of threshold levels (depending on personal circumstances) it is not difficult to specify an appropriate value for the single threshold, a_1.

4.3.3 The distribution of income

The expression for total revenue in (4.7) would serve little purpose if it were not possible to obtain convenient expressions for the various moment distributions $F_r(y)$, and moments μ'_r. Fortunately the properties of the lognormal distribution $\Lambda\ (\mu,\ \sigma^2)$ can be used, since this describes reasonably well the distribution of the large majority of tax payers, and

$$\Lambda_r(\mu,\ \sigma^2) = \Lambda(\mu + r\sigma^2,\ \sigma^2) \tag{4.9}$$

$$\mu'_r = \exp(r\mu + \tfrac{1}{2}r^2\sigma^2) \tag{4.10}$$

where μ and σ^2 denote the mean and the variance respectively of the logarithms of income.[11] The term μ'_1 is the arithmetic mean income of the population, which may also be denoted $\bar{y}$. The terms in (4.8) can therefore readily be evaluated for alternative tax schedules and assumptions about μ and σ^2.

4.4 PROPERTIES OF ALTERNATIVE SYSTEMS

Having set out the analytics of the tax model in the previous section, the built-in flexibility of various tax structures can now be examined. A useful feature of the model is that it can be used to examine the properties of tax parameters for a wide variation in average income. An equal proportionate increase in all incomes will change the mean of the logarithms of income, but will leave relative

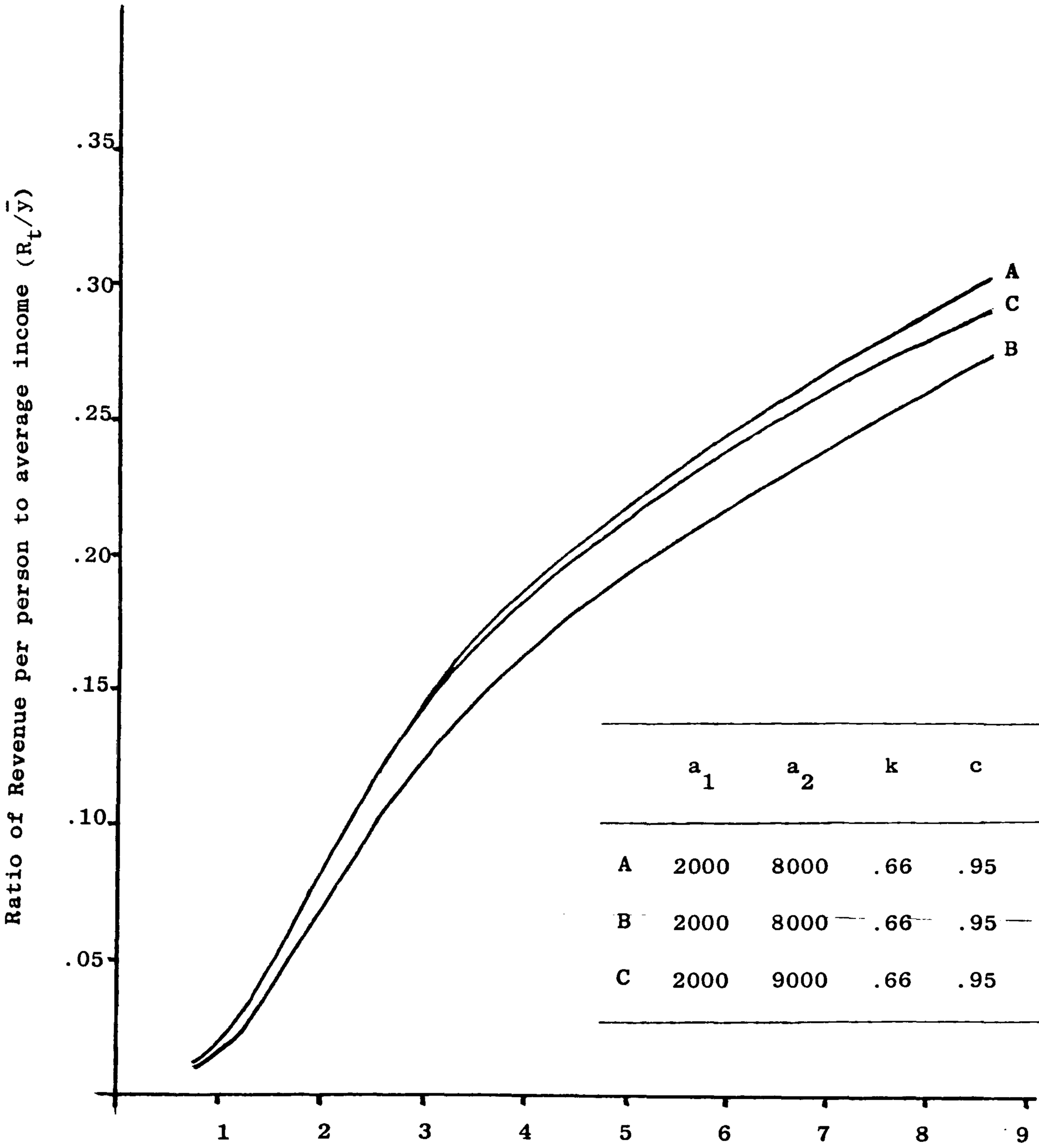
dispersion unchanged.[12] The effect on total revenue of a general increase in incomes, with an unchanged tax schedule, can therefore be examined by considering variations in μ, with σ^2 unchanged. Comparisons between structures can also be made, in order to consider the implications of discretionary changes at different average income levels. It is most convenient to illustrate the results diagramatically, which have been obtained using a simple computational method for evaluating the distribution function Λ.[13]

4.4.1 Effective average tax rates

It is useful to measure changes in total income tax revenue per person, R_t, expressed as a ratio of average income, $\bar{y}$, which may be called the effective average rate. Figure 4.2 provides three examples using equation (4.7), where it is assumed that σ^2 remains constant at 0.2. This roughly reflects the dispersion of male earnings over all age groups in the U.K. The profile marked A in Figure 4.2 corresponds to the tax schedule which is illustrated in Figure 4.1. This profile can be seen to be sigmoid in shape, and asymptotically approaches a maximum rate of 0.95, which is the limiting case where all individuals pay the highest marginal rate. The section of the profile corresponding to low values of $\bar{y}$ relative to the threshold may be thought to be appropriate for a country with a very small direct tax base.

Figure 4.2 shows two further profiles. The effects of a reduction in the standard rate t_1, to 0.30, and an increase in the level of income a_2 at which higher marginal rates become payable, to £9000, are illustrated in profiles B and C respectively. Although all three profiles are sigmoid in shape, they become approximately linear over a range of mean income from approximately £5000 to £9000. This arises because within that range a large proportion of incomes

FIGURE 4.2 TOTAL REVENUE



	a_1	a_2	k	c	t_1
A	2000	8000	.66	.95	.34
B	2000	8000	.66	.95	.30
C	2000	9000	.66	.95	.34

lie between a_1 and a_2 and are therefore subject to a constant marginal tax rate. As $\bar{y}$ rises further this effect will diminish, and the profiles will become more concave.

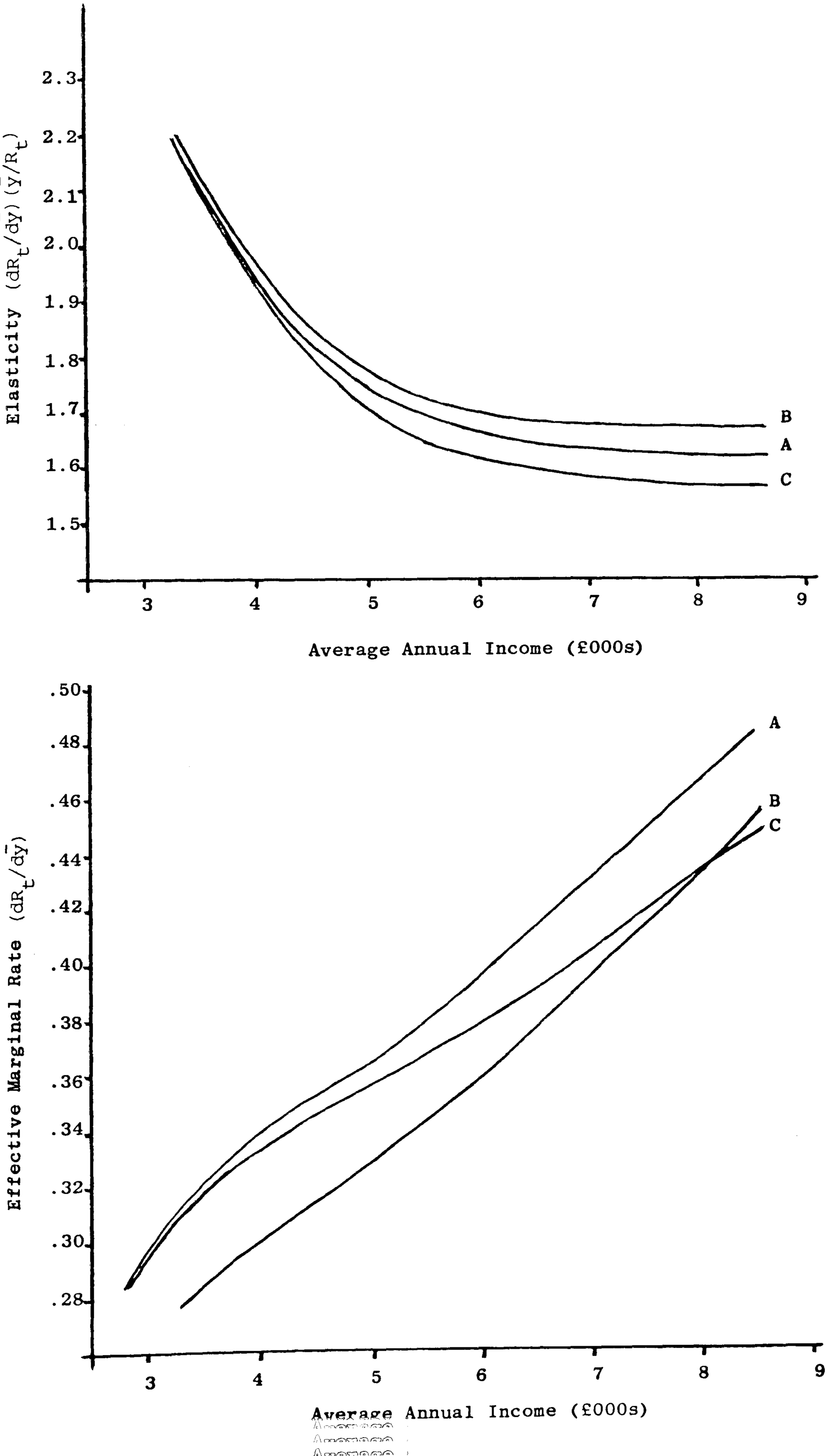
From these profiles it is not difficult to determine the extent of an inflation tax. An increase in money income due solely to inflation will lead to an increase in the effective average tax rate $(R_t/\bar{y})$ as a result of a movement along a particular profile. Constancy in the effective average tax rate can, of course, be maintained by increasing a_1 and a_2 by the same proportion as $\bar{y}$, so moving the profile to the right.

4.4.2 Effective marginal rates and revenue elasticities

This method of examining income tax revenues also allows direct calculation of effective marginal tax rates (EMR), $dR_t/d\bar{y}$, and elasticities of tax revenue with respect to mean income, $(dR_t/dy)(y/R_t)$. These measures can be calculated for any tax structure or series of tax structures. This is an advantage of the present model, since previous studies of income tax elasticities apply to particular years only and have not examined the extent to which elasticities vary as average income increases, using an unchanged tax schedule.[14]

Figure 4.3 shows elasticities and EMRs associated with the profiles in Figure 4.2. As may be expected, elasticities are higher the lower the mean income level, while EMRs rise with mean income. Figure 4.3 shows clearly that the revenue elasticity schedule levels out at higher mean income levels, as a consequence of the 'standard rate' section in the tax function. However, the elasticity schedule will decline as mean income rises beyond £9000 (when more incomes become taxable at higher marginal rates). The effect of the standard rate on the EMR profiles is rather different. EMRs increase

FIGURE 4.3 ELASTICITIES AND EFFECTIVE MARGINAL RATES



at a declining rate at mean income levels below about £5000. But the increase in EMRs is more uniform as $\bar{y}$ rises beyond this level. However the rate of increase will decline as mean income increases beyond £9000.[15]

Finally it is interesting to note the effects of some parameter changes on elasticities and EMRs. Figure 4.3 shows that reducing the standard tax rate to 0.30 (profile B) increases the revenue elasticities and reduces the EMRs associated with each level of mean income. The effects are however greatest at higher mean incomes. Increasing the value of the paremeter a_2 to £9000 (profile C) causes both elasticities and EMRs to decrease for each value of $\bar{y}$. It may also be seen that, unlike profile B, the decrease in the EMR compared to profile A is much greater at higher mean income levels.

Since the tax function in Figure 4.1, from which profile A is derived, approximates the U.K. in 1977/78, the results may be compared with estimates for the U.K. obtained by Hutton and Lambert (1980a). They found an elasticity of 1.78 and, although they do not present an estimate for the EMR, a value of 0.30 is implied.[16] These estimates may be compared with values obtained from profile A at the appropriate mean income level of about £5000, where the elasticity and EMR are respectively 1.75 and 0.36. This simple method of modelling a complex tax system can nevertheless produce sensible values for the measures commonly used to examine the built-in flexibility of tax systems.[17]

4.5 SUMMARY AND CONCLUSIONS

The aim of this chapter has been to provide a method of examining and comparing various progressive income tax structures.

The tax structure is modelled by a simple non-linear schedule which allows for a wide range of variations in marginal tax rates, and the distribution of income is approximated using the lognormal distribution. The model may therefore be described as a 'non-linear lognormal' model.

Using a simple computational method, schedules for the effective average tax rate, revenue elasticity and effective marginal rate were obtained. It was shown that effective average tax rate schedules are sigmoid in shape. These schedules can be used to identify the effects of discretionary tax changes. The extent to which the revenue elasticity and effective marginal rate vary as mean income varies was examined for a variety of tax structures. It was shown that for each structure the elasticity falls, and the effective marginal rate rises, as mean income increases. However, the rate of change varies considerably across tax structures.

These results clearly indicate that the extent of income tax revenue growth as nominal incomes increase is heavily dependent on the relationship between real and money incomes and the extent of indexation of income tax allowances. It was shown for example that where nominal incomes rise solely because of inflation, an increase in tax revenue results from the 'inflation tax'. Shifting of tax allowances in proportion to inflation will however remove any built-in flexibility. The consequences of alternative forms of indexation of allowances are examined in chapter 5 in the context of a wider fiscal model. Further discussion of the implications for income tax revenue growth as incomes grow is therefore postponed to chapter 5.

Footnotes

1. See chapter 10.

2. However, various elasticity schedules relating to the West German tax system have been obtained by Spahn (1975), who identifies 'population effects' in addition to 'income effects', using cubic spline-functions to describe the income distribution.

3. The model is also used in Creedy and Gemmell (1984) to examine the progressivity of direct and indirect taxes, with income transfers, for the U.K. system.

4. This simplifying assumption is not entirely realistic for most income tax systems, but it is not difficult to obtain a representative value. A single value of allowances was also used by Hutton and Lambert (1982) in their 'linear-pareto' model.

5. This schedule can also be applied to tax systems which do not use a standard rate, by setting t_1 and a_1 to zero. Equation (4.2) must then be respecified as $h = (c - m)a_2^k$, where m is the marginal tax rate at the level of income where individuals begin to pay tax, a_2. This function is therefore described by only four parameters, c, m, a_2 and k.

6. The condition $k < 1$ is required since the marginal tax rate is given by $dT(y)/dy = 1 - (1 - k)y^{-k}$, and $d^2T(y)/dy^2 = k(1 - k)y^{-1-k}$, which must be positive.

7. These values may be compared with the schedules given in Kay and King (1980, pp. 22-3) for the tax year 1979/80, for a variety of countries.

8. For 1977/78 values (using the middle of each income range as the y value, with £30,000 as the maximum mid-point), the following result was obtained using data from Meade (1978):

$$z = \underset{(112.44)}{1.05} - \underset{(-50.32)}{0.71x} \qquad R^2 = 0.997, \quad k = 0.5$$

Figures in parentheses are t-values. This gives an asymptote of 1.05 and a 'standard rate' of 0.34 ($\beta = c - t_1$), and provides a very good fit. Slightly different values of c and k were used for the schedule of Figure 4.1 as the line was not constrained to go through the midpoints of the ranges.

9. For a useful discussion of moment distributions in the measurement of inequality see Hart (1975). The well known Lorenz curve is of course the relationship between the first moment distribution, $F_1(y)$, and the distribution function, $F(y)$. Notice that r can be non-integer.

10. In the case where a standard rate does not operate (4.7) simpliies to

$$R_t = cG(1, a_2) - hG(1 - k, a_2)$$

11. See Aitchison and Brown (1957, pp. 8, 12). On the use of the lognormal to describe the distribution of income see (ibid. pp. 107-120).

12. In fact it is not necessary to assume equal proportionate changes, so long as the relative dispersion of incomes remains unchanged.

13. In the calculations reported here the approximation given in Aitchison and Brown (1957, p. 71) was used.

14. See Hutton and Lambert (1980, p. 903), Hutton and Lambert (1980a, p. 17) and Dorrington (1974, p. 576-8). More detailed results are given in Hutton and Lambert (1982). As noted in footnote 2, more general results for the West German system have been obtained by Spahn (1975).

15. Excluding a standard rate from the tax schedule changes both the elasticity and EMR schedules. The tendency, evident in

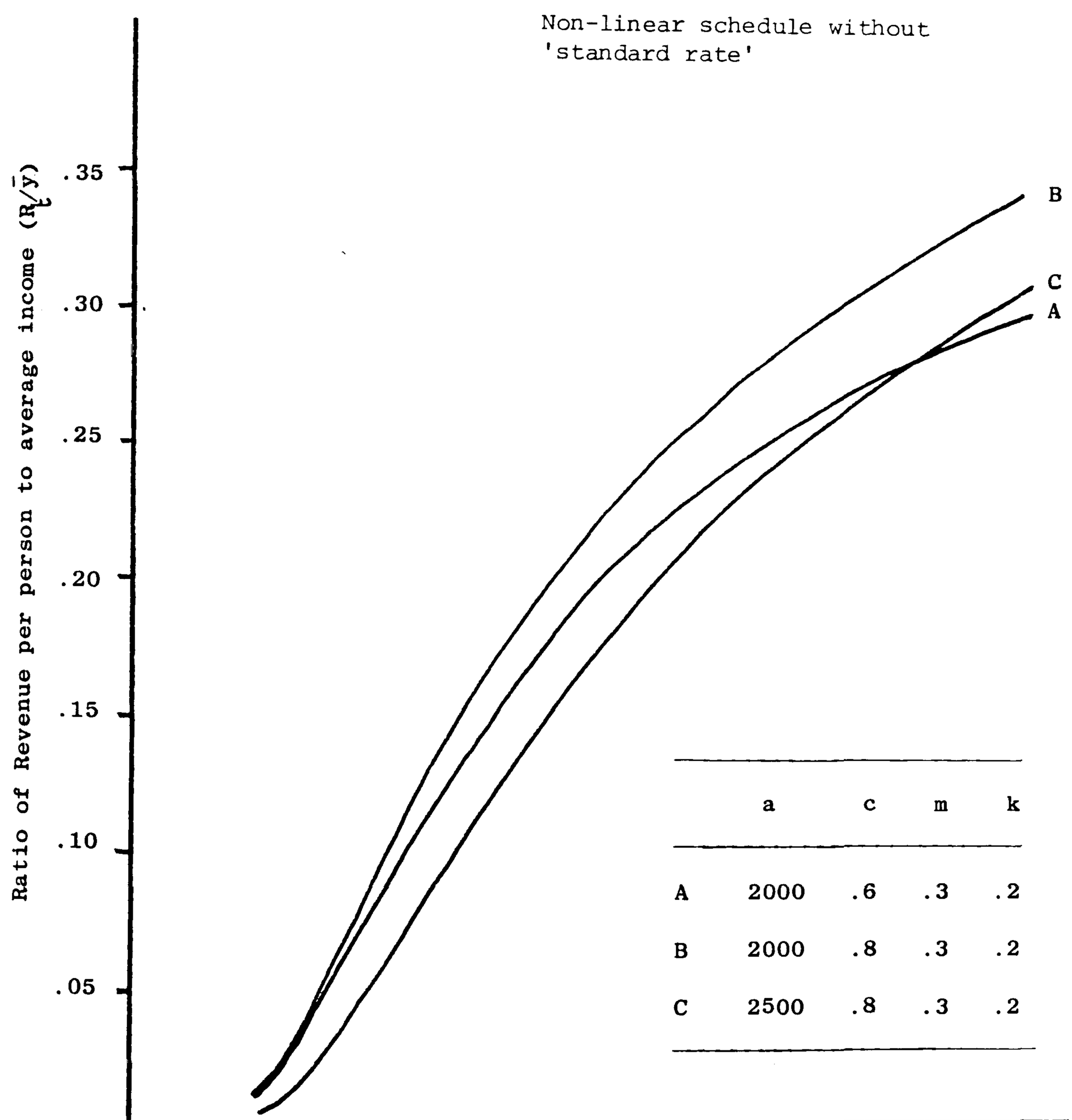
Figure 4.3, for the elasticity schedule to level out is removed and the schedules decline more uniformly. The EMR schedules increase at a diminishing rate as mean income increases over the whole range of mean incomes. See Appendix 4.1.

16. This is based on their earlier estimate of the average tax rate in Hutton and Lambert (1980, p. 902).

17. The values are not very sensitive to changes in the dispersion of pre-tax incomes (as measured by σ^2), over the relevant range of average income. For example, when σ^2 takes the value of 0.15, the values of the revenue elasticity and effective marginal rate are respectively 1.72 and 0.359, at the mean income of £5039. The corresponding values for $\sigma^2 = 0.25$ are 1.75 and 0.378.

APPENDIX 4.1 REVENUE, ELASTICITY AND EFFECTIVE MARGINAL RATE SCHEDULES (WITHOUT A STANDARD RATE)

FIGURE 4.4 TOTAL INCOME TAX REVENUE

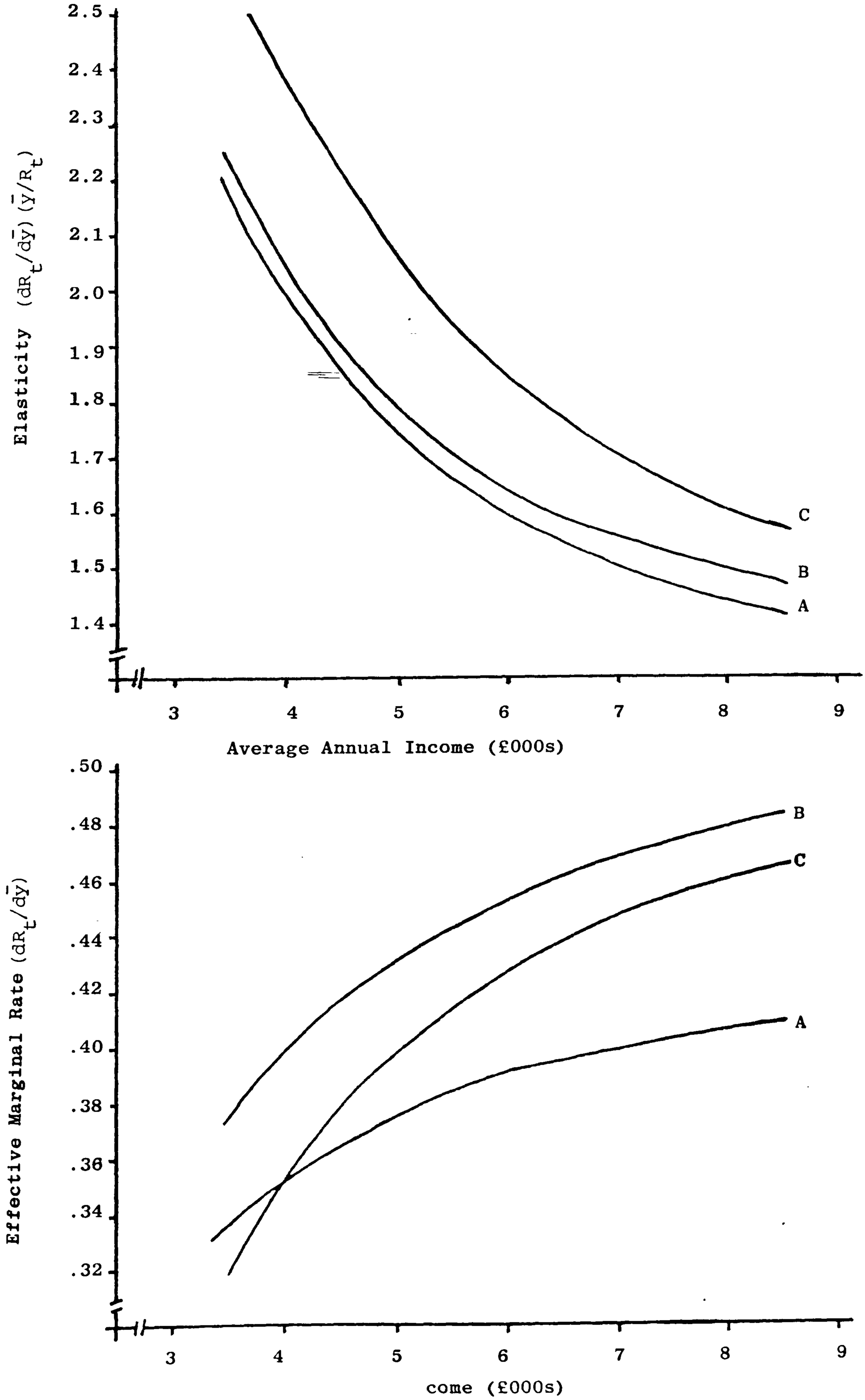


	a	c	m	k
A	2000	.6	.3	.2
B	2000	.8	.3	.2
C	2500	.8	.3	.2

Comparing Figures 4.2 and 4.4 it can be seen that in the absence of a 'standard rate' of income tax the revenue schedules no longer display the approximately linear section between about £5000 and £9000.

FIGURE 4.5 ELASTICITIES AND EFFECTIVE MARGINAL RATES

(without standard rate)



C H A P T E R 5

ECONOMIC GROWTH AND REVENUE FROM A TAX/TRANSFER SYSTEM

5.1 INTRODUCTION

The analysis of chapter 4 provided a method of modelling the flexibility of a progressive income tax which, though based on the U.K. income tax, is likely to be applicable to a wide range of income tax regimes. In order to finance changing levels of expenditure, governments are of course interested in revenue from the tax system as a whole and its flexibility at different levels of income. The purpose of this chapter is therefore to extend the tax model of chapter 4 to consider the flexibility of various direct and indirect taxes. Since in most tax systems revenues raised by particular taxes are not independent of each other it is necessary to produce a tax model which is capable of taking into account the main interdependencies between individual taxes. It is apparent for example that revenue from expenditure taxes cannot be treated separately from personal income tax revenue, since changes in the latter will affect disposable income and hence expenditure.

Rather than consider a hypothetical tax system, the model is based on the U.K. tax system and includes the personal income tax discussed in chapter 4, the National Insurance system (a social insurance tax), Value Added tax and a simplified system of income transfers to the low paid.[1] Corporate taxation is not included in the model. Although the particular forms of the taxes considered are specific to the U.K. in certain respects, similar taxes and transfers are used in a wide range of countries.

The growth of tax revenues will of course be influenced by the ways in which tax thresholds are indexed to changes in nominal incomes. It is important therefore, in analysing the built-in flexibility properties of particular taxes, to examine the effects of indexation

of these thresholds. In the U.K. the extent of indexation has varied across taxes and over time, particularly during periods of inflation. In some cases legislation has stipulated certain minimum levels of threshold indexation. Possible effects of different forms of indexation on tax revenues are discussed in Section 5.3. First however the tax/transfer model is described in Section 5.2. Simulating indexation of thresholds in the model in Section 5.4 allows the flexibility properties of the tax system to be examined. Section 5.5 summarises and concludes the chapter.

5.2 THE TAX/TRANSFER MODEL

This section describes the main components of the model which is used in section 5.4 to examine tax revenue growth. It is required to capture some of the main characteristics of the U.K. system in order to clarify the interdependencies, without wishing to include all of the fine detail of each component.

5.2.1 Income taxation

The analysis uses the same non-linear tax schedule as that described in chapter 4, and considers only income from employment, (which forms over 70% of average household income in the U.K.). This limitation is made so that income taxation and National Insurance, discussed in 5.2.2 below, apply to the same measure. Letting T(y) be the tax paid by an individual with income y, the schedule was defined in chapter 4.3 as follows

$$\begin{aligned} T(y) &= 0 && y < a_1 \\ &= t(y - a_1) && a_1 < y < a_2 \\ &= t(a_2 - a_1) + (y - a_2)\ (d - hy^{-k}) && a_2 < y \\ \text{with } h &= (d - t)a_2^{k} \text{ and } k < 1 && \end{aligned} \tag{5.1}$$

The same allowances or threshold levels a_1 and a_2 apply to all individuals and although this assumption is not entirely realistic the schedule can be used to approximate the U.K. structure closely, as shown in chapter 4. For present purposes the schedule may be assumed to apply to a particular type of household, and individual variations in allowances (arising for example because of differences in mortgage and other payments) are ignored.[2] The values of d and k may be estimated using regression analysis (see chapter 4), and values of 0.95 and 0.65 are used for d and k respectively.

5.2.2 National Insurance contributions

The schedule relating NI contributions, C(y), to income, y, in the U.K. is as follows

$$\begin{aligned} C(y) &= 0 && y < y_L \\ &= cy && y_L < y < y_U \\ &= cy_U && y > y_U \end{aligned} \qquad (5.2)$$

Thus contributions are paid when earnings exceed a lower limit y_L, and are directly proportional to gross earnings, up to an upper limit y_U. The marginal rate of contributions is therefore zero above the upper limit. An important feature of the system is that NI contributions are not deducted from income in the calculation of taxable income.

To illustrate the interaction between income tax and NI, consider a standard rate taxpayer who is also within the NI earnings limits. Total income tax and NI payments are therefore $t(y - a_1) + cy$. The variations in the contributions rate and standard tax rate which would leave the individual's total payments unchanged are therefore given by

$$dc = dt\{(a_1/y) - 1\} \qquad (5.3)$$

Thus if earnings are double the tax threshold (that is, $y = 2a_1$) a change in the National Insurance contributions rate of 1 percentage point is equivalent to a change in the standard rate of income tax of 2 percentage points.[3]

5.2.3 Transfer payments

Many individuals may pay little in the form of income tax and NI contributions but will pay indirect taxes in the form of Value Added Tax resulting from their expenditure. Some of this expenditure may in turn be financed from transfer payments, so that it is necessary to specify a form of transfers before an expenditure tax is considered.

There is in the U.K. a vast variety of means-tested and other benefits, but this model examines a simple 'guaranteed minimum income' (MIG), whereby all those with a gross income below the level y_B have their net income brought up to the level b. This kind of system actually gives a relationship between net and gross income which is broadly similar to the British social security system, though the latter is less smooth, and is administered in a much more complex way.[4]

When considering alternative policies it is important to realise that the value of the basic minimum, b, cannot be set independently of the values of y_B, a_1, t and c. With $y_B > a_1 > y_L$, in order to ensure continuity in the schedule relating net income to gross income, it is required to have

$$b = y_B(1 - c - t) + a_1 t \qquad (5.4)$$

In this case individuals receive transfer payments and pay income taxation and National Insurance, as in the U.K. system.

5.2.4 Value Added Tax

The taxes and transfers considered above provide a non-linear transformation between gross income and disposable (post-income tax NI and transfers) income. To complete the specification of the model it is necessary to specify a relationship between expenditure and the amount of VAT paid. In the U.K., as in other countries, a significant number of goods and services do not attract VAT, and the proportion of expenditure devoted to zero-rated goods varies as total expenditure varies. Furthermore, VAT is levied on the tax-exclusive price of goods and services.

If q denotes expenditure, V(q) the VAT paid, v the VAT rate, and r(q) the proportion of expenditure on zero-rated goods, then the relationship between V(q) and q is given by

$$V(q) = q\{1 - r(q)\}\ \{v/(1 + v)\} \tag{5.5}$$

For present purposes it is necessary to specify the form of r(q). The approach taken was to estimate a log-linear relationship between r(q) and q, using Family Expenditure Survey data for 1978 for all households combined. The Ordinary Least squares result is

$$\log r(q) = \underset{(0.0633)}{0.654} - \underset{(0.0143)}{0.302} \log q \qquad R^2 = 0.970 \tag{5.6}$$

The above results apply to weekly expenditure, so that the relationship between r(q) and q when the latter is in annual terms is given by

$$r(q) = 6.343\ q^{-0.302} \tag{5.7}$$

The effects of varying the rate of VAT may be examined by substituting (5.7) into (5.5) for alternative values of v. This method assumes that any substitution between zero and non-zero-rated goods as v varies is such as to leave the <u>proportion</u> of expenditure devoted to zero-rated goods unchanged at each expenditure level.

It is useful to illustrate the different components of the model, as shown in Figure 5.1, for a particular set of rates and thresholds. The following values are used: the tax thresholds a_1 and a_2 are £2000 and £8000 respectively; the NI lower and upper earnings limits are £700 and £5000 respectively; and a guaranteed minimum income of £1832 is received by individuals with a gross income below £2250; the standard tax rate is 0.32; and the NI contribution rate is 0.15. These values are representative of the U.K. system in 1978, although they are rounded for convenience.[5]

Quadrant A of Figure 5.1 shows the relationship between the sum of income tax and National Insurance contributions, and gross income. The relationship consists of five sections. An individual with gross income below £700 pays no income tax or national insurance.

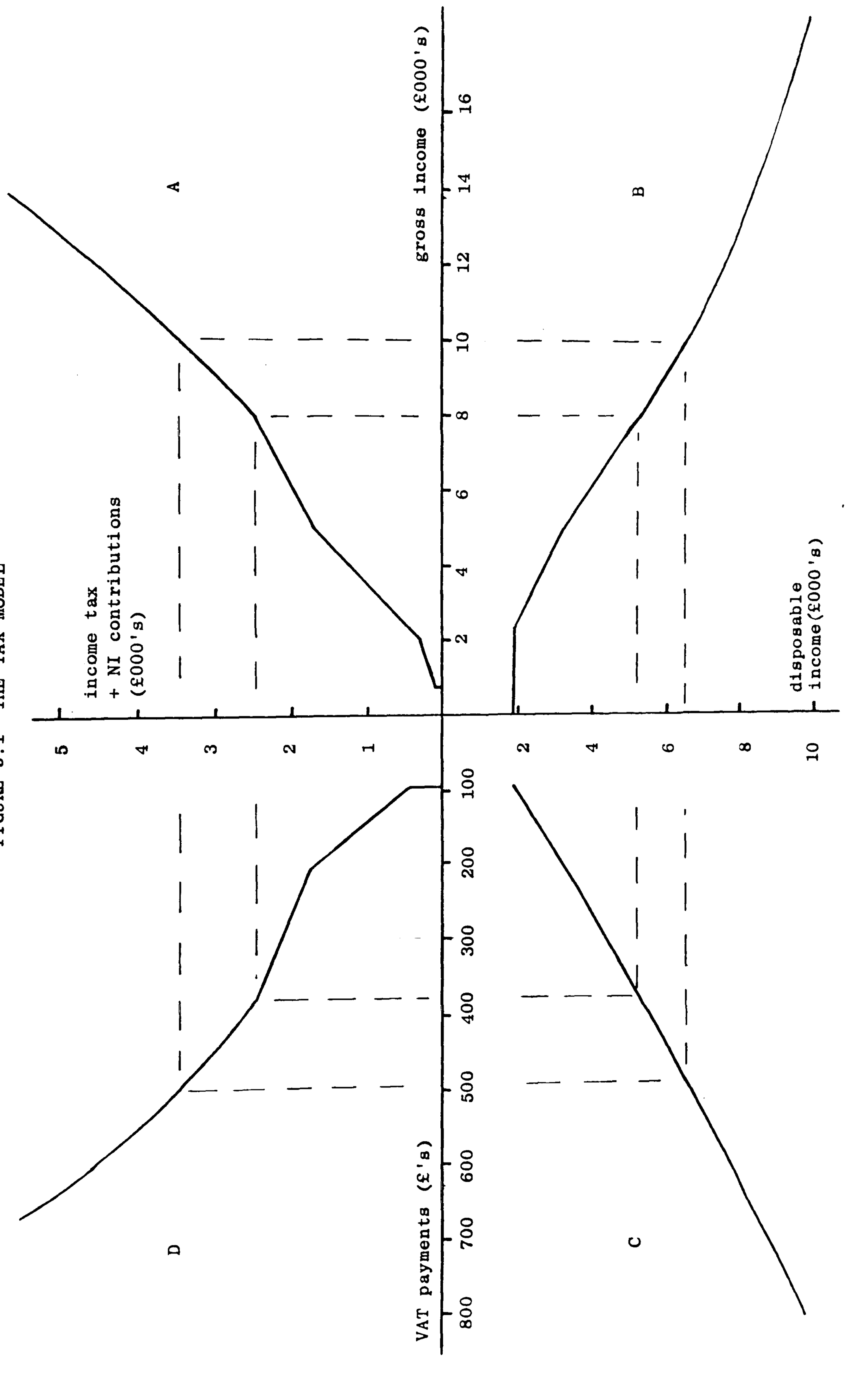


FIGURE 5.1 THE TAX MODEL

Thereafter contributions are paid at the constant rate c until the £2000 income tax threshold is reached, where the rate is t + c up to £5000. There is a further linear section between the upper earnings limits and £8000 (a_2). Above this level the non-linear section of the income tax schedule applies.

The resulting relationship between gross income, y, and y - T(y) - C(y) is illustrated in quadrant B. This quadrant also shows the effects of a transfer system in which all those with a gross income less than £2250 receive benefits (after paying tax and NI) which raises their net-income to £1832. The present analysis assumes that all disposable income is consumed. This assumption avoids the complexities of a savings model and the tax treatment of different methods of saving. It may be noted that if in fact the proportion of disposable income which is saved increases with disposable income, then VAT is less progressive than implied in the results presented below. The built-in flexibility of VAT would also therefore be less.

Quadrant C then shows the relationship between disposable income (expenditure) and VAT payments, from equation 5.5. Finally, quadrant D illustrates the relative magnitudes of direct taxes (income tax and NI) and indirect taxes (VAT), showing the extent to which the former is relatively more important than the latter at high income levels.

5.2.5 The distribution of gross income

With the above framework it is not possible to obtain convenient analytical results for total tax revenue. In order to examine the effects on built-in flexibility of variations in the parameters of the model it is therefore necessary to use a simulated distribution of

gross income. The same distribution is used for each set of rates and thresholds considered, as no allowance is made for incentive effects. The results presented below are again based on a simulated lognormal distribution of income.[6]

Initial parameter values of $\mu = 8.0$ and $\sigma^2 = 0.2$ were used to obtain the incomes of a simulated sample of 1000 individuals. These values of μ and σ^2 were chosen as corresponding closely to the distribution of gross annual earnings in Britain in 1978, though it should be stressed that the following results are not affected by the particular values used.[7] The effects of growth in nominal incomes are examined by adjusting all y_i by a fixed proportion, δ, per time period. Real incomes adjust by $(1 - \delta - \theta)$ per time period where θ is the rate of price change per time period. Indexation is simulated by a simultaneous adjustment of tax thresholds at alternative rates. As with income tax in chapter 4, the built-in flexibility of each tax can be examined by considering changes in revenue per person as a proportion of average income as average income rises.

5.2.6 The method of analysis

The model outlined above can be applied to the simulated gross incomes. First, the National Insurance contributions of each individual are calculated, having set the values of the lower and upper earnings limits. The total value of contributions per person, R_c, is calculated. Each individual's income tax is then calculated using the schedule (5.1), giving the total income tax revenue per person, R_t. Since income tax and NI operate quite separately, the order of these calculations is arbitrary.

Before examining VAT payments it is then necessary to apply the system of transfer payments, as described in section 5.2.3. Under that

system some individuals pay income tax and NI contributions and receive transfer payments to bring their gross income up to a specified level. The total value of transfer payments per person (that is, total transfers divided by the total population) is obtained as T.

On the assumption that all disposable income is consumed each individual's VAT payments are then calculated for a specified rate of VAT. Total VAT payments per person are denoted R_v.

5.3 BUILT-IN FLEXIBILITY AND INDEXATION

An important property of the model outlined in Section 5.2 is that it captures some of the complex interdependencies of the main components of the U.K. tax system. Thus the value of transfer payments or revenue raised from VAT, for example, are dependent on the structure of income tax and NI. VAT revenue is of course also dependent on the value of transfer payments. These interdependencies are crucial when examining effects of indexation on built-in flexibility, since if the structure of one tax can affect the revenue raised by another, then similarly indexation of certain tax threshold levels can affect the built-in flexibility of a number of taxes.

For each of the taxes/transfers considered in the model the form of indexation which is relevant may vary between the short and long-terms. Thus while non-indexation (or indexation at less than the inflation rate) of some tax threshold may be possible in the short-term it is much less likely to be politically possible in the longer term. If however the acceptable burden of taxation rises with long-run increases in real incomes, as some would suggest, this may be achieved by 'underindexing' thresholds rather than adjusting rates of taxation. If on the other hand it is desired to maintain the distribution of post-tax income constant over the long-term then, since different taxes/transfers have differing redistributive effects, earnings indexation of all thresholds is required, in the absence of other discretionary changes. In the short-run of course variations in indexation may be acceptable.

5.3.1 Income Tax and National Insurance

The type of indexation used in practice is likely to vary across taxes. In the U.K. legislation has to some extent governed the

indexation of National Insurance, requiring the thresholds y_L and y_U to be indexed to prices or average earnings. Indeed legislation has, at different times, required various forms of earnings or price indexation of thresholds, in addition to fixing the ratio of upper to lower earnings limits. Variations in income tax indexation have been regularly used by governments for both revenue and distributional considerations. It is well known that in times of inflation indexing thresholds at less than the inflation rate will increase government revenue from income taxes, although the likelihood of a resulting loss of some VAT revenue is rarely recognised. At times governments have been committed to price indexation of income tax thresholds, while the 1983 Budget provided an example of an attempt to reduce the tax burden by 'overindexation' of thresholds.

In the absence of any indexation the built-in flexibility of the income tax and NI will move in opposite directions. Since income tax is progressive and NI slightly regressive (see Creedy and Gemmell (1984)), an increase in incomes will increase the revenue raised from income tax but reduce NI revenue relative to $\bar{y}$. A similar effect will occur with price indexation of NI and income tax thresholds if earnings grow faster than prices. However since NI is an almost proportional tax the reduced revenue when income rises could only slightly offset the rising income tax revenue. By fully indexing thresholds to earnings any built-in flexibility can of course be removed, such that tax revenue rises proportionately with incomes.

5.3.2 Value Added Tax

There are no explicit thresholds in the value added tax and therefore indexation as a policy variable is not relevant.[8] However since VAT revenue is partly determined by individuals' allocation of

expenditure between VAT-rated and non-VAT rated goods it is important to allow for possible changes in this allocation in response to changes in incomes. That is, although it has been observed in cross-section that a greater proportion of expenditure is directed to VAT-rated goods by those with higher incomes, does this relationship hold as incomes rise over time?

To test for changes in the relationship between total expenditure and the proportion devoted to non-VAT-rated goods, OLS regressions of the form $r(q) = \alpha q^{-\beta}$ were tested using Family Expenditure Survey data for four years (1973, 1975, 1979, 1980). This period witnessed a sizeable rise in nominal incomes and allowed changes in the short and longer term to be observed. The results suggested two useful properties for the modelling of VAT. Firstly the relationship between total expenditure, q, and r(q) showed considerable stability with the estimated value of β constant (at about 0.34) over the four years. Secondly the relationship adjusted from one period to the next (α increased) such that the value of r(q) at mean expenditure levels remained constant. This stability suggests that with a general increase in nominal incomes, the proportion of expenditure on VAT-rated goods remains fairly constant, i.e. substitution towards VAT-rated goods seems negligible.

It would seem most appropriate therefore to adjust the r(q)-expenditure relationship with nominal income changes, such that there is no built-in flexibility due solely to a changing allocation of expenditure with increases in incomes. This 'indexation' is designed to model behaviour most accurately, and unlike indexation of other taxes is not a policy variable.[9]

VAT revenue depends on a number of other factors in addition to the r(q)-expenditure relationship. Firstly, the form of indexation of income tax and NI, by altering the flexibility of income

tax and NI revenues, changes the relationship between gross and net income and thus has differing effects on the VAT tax base. Price indexation of income tax thresholds for example reduces net relative to gross income (if earnings rise faster than prices) as incomes increase. This 'income effect' in turn reduces VAT revenue.

Secondly, VAT revenue depends on the way in which the guaranteed minimum income, b, is adjusted and through income tax and NI, on changes in y_B (see equation (5.4)). Increases in y_B relative to average income increase the proportion of the population eligible for transfers. Various forces will be in operation here. Firstly different forms of adjustment of b will have differing effects on the dispersion of disposable incomes. This 'redistribution effect' will depend on how the transfer system operates. An increase in b which increases the equality of disposable income (reduces a measure of dispersion), by transfering income mainly from those with high incomes to those with low incomes, will increase the proportion of total expenditure on non-VAT-rated goods and hence have a reductive influence on VAT revenue.[10] Secondly, however, indexation of benefits also creates an 'income effect' by increasing disposable income of the lower paid (and non-working) which tends to increase VAT revenue (even in the absence of differences in the proportion of expenditure on VAT-rated goods).

5.2.3 Transfer Payments

Indexation of transfer payments, in a system of 'social security' is likely to depend on a number of factors. To the extent that transfer payments are a poverty relief instrument their indexation will depend on whether policy is aimed at absolute or relative poverty relief. If poverty is viewed relatively then

indexation of the MIG to earnings would seem most appropriate. However an absolute poverty view would require only that the MIG be indexed to prices. Secondly, the appropriate indexation may vary according to who is in receipt of benefits. For example the use of earnings indexation allows non-earners to 'share' in productivity growth. In the case of pensioners it has been argued that this is justified because of past contributions to growth by past savings. In practice in the U.K. pensions have often not been indexed to earnings. For the unemployed, there has been vigorous debate in recent years over whether benefits should be linked to average earnings or prices. Recent policy has moved towards price indexation. Further, for low income earners incentive effects may vary between different forms of indexation. Finally, although the policy debate is most likely to be in terms of the value of the MIG, b, the resulting value of y_B, the level of gross earnings below which benefits are payable, may be important. There could be significant incentive effects if large numbers of earners are subject to marginal tax rates of 100%. Changes in the relationship of y_B to average earnings due to indexation may also have important effects by, for example, altering the relative returns to work and leisure.

The influences on the built-in flexibility of transfer payments are perhaps greater than on any of the taxes considered. Total 'expenditure' on transfers depends on the value of the MIG, the value of gross income determining eligibility for benefits and the numbers receiving benefits. For individuals who both pay tax and receive benefits the flexibility of income tax and NI will influence the value of transfer payments received.

The proportion of the population receiving benefits is obviously important for total expenditure on transfers. This may rise

with increases in incomes if, for example, labour supply is 'backward-bending' or if longevity of pensioners increases at higher income levels. With an ageing population an increasing proportion of transfer recipients in the form of pensions can be expected. Changes in the value of b may affect those receiving benefits because 100% marginal tax rates will affect more people (via the direct link with y_B in equation (5.4)), and because if the value of b changes relative to average income the decision to work may be affected.

Even if possible incentive effects are ignored the way in which b is indexed will be important for transfers flexibility by altering the nominal or real value of benefits. If b is indexed to prices (maintaining constant real benefits) the 'burden' of financing benefits is reduced if earnings grow faster than prices. If poverty is seen in relative terms this may not be acceptable. Recent practice in Britain however has been to index benefits to prices.

While indexation of benefits to earnings ensures benefit recipients' disposable incomes rise commensurately with those of non-recipients, total transfers expenditure may still change relative to average income due to changes in the proportion of the population receiving benefits. Rearranging equation (5.4) gives

$$y_B = \{1/(1 - c - t)\}\, b - \{t/(1 - c - t)\}a_1 \qquad y_B > a_1 > y_L \qquad (5.8)$$

and hence y_B is determined not only by b but also by the marginal tax rates t and c and the income tax threshold a_1. Since the relationship between b, y_B and average income may be both economically and politically important it is interesting to note that b and y_B will not necessarily adjust commensurately with respect to $\bar{y}$. Differentiating (5.8) with respect to time gives

$$\dot{y}_B = (b/\alpha y_B)\, \dot{b} - (a_1\, \beta / y_B)\, \dot{a}_1 \qquad (5.9)$$

where $\alpha = 1 - c - t$, $\beta = t/(1 - c - t)$, and dotted variables represent rates of change. Equation (5.9) shows that if a_1 and b are similarly indexed (to either earnings or prices), then $\dot{a}_1 = \dot{b}$ and there is no divergence between $b/\bar{y}$ and $y_B/\bar{y}$, as $\bar{y}$ rises, since $\dot{y}_B$ is equal to $\dot{b}$. However if income tax thresholds are indexed less than benefits, $y_B/\bar{y}$ rises faster (declines slower) than $b/\bar{y}$. If income tax thresholds are not indexed ($\dot{a}_1 = 0$), then $y_B/\bar{y}$ rises faster (declines slower) than $b/\bar{y}$ if, and only if, $(b/y_B) > 1 - c - t$. In fact it can be shown that the possibility of this condition holding is dependent on the level of average income (being less at low average income levels) and NI and income tax <u>rates</u> (being less likely with high values of t and c).

Therefore it is clear that indexation of b and other thresholds is important for the built-in flexibility of transfer payments not only because it affects per capita benefits but because the numbers receiving benefits can vary. In addition, although much political and economic debate centres on the level of benefits relative to average earnings, these results show that changes in $y_B/\bar{y}$, equally important when assessing incentive effects, may be quite different from changes in $b/\bar{y}$. The quantitative significance of this is examined in Section 5.4.

Finally the form of indexation of NI and income tax thresholds may be important independently of those tax effects on y_B. If NI and income tax thresholds are linked to prices and earnings outgrow prices, the additional tax paid by those below y_B means that those individuals now need more in the form of transfers to bring their disposable income up to b. Notice however that <u>net</u> transfers remain unchanged since the increased value of transfers is entirely due to increases in taxation. This distinction may be quite important for policy. For governments concerned with the net tax revenue they receive it is

changes in the net value of transferswhich are important. However when social security expenditure is considered separately from taxation (as it frequently is) it is the total value of transfers, or the benefit level, which is often considered. Clearly the built-in flexibility of total and net transfers will not necessarily be the same.

5.3.4 Net Revenue

It was suggested earlier that correct evaluation of changes in the authorities' tax revenues must incorporate a transfer payments system since expenditure taxes in particular are likely to be affected by it. The value of tax revenue available for allocation across public expenditure needs is important to governments and in this model is measured by net revenue — $R_t + R_c + R_v - T$. Having considered the various influences on the built-in flexibility of individual taxes and transfers it is clear that the combined effects on the built-in flexibility of net revenue are not readily predictable, though such prediction may be important for tax authorities. It may be thought that the flexibility of net revenue will be greatest when tax revenue rises most rapidly and transfer payments rise least rapidly, relative to average income. However the interaction between taxes and transfers means that rapid increases in tax payments are likely to be associated with more rapid increases in transfers because some individuals pay tax and receive benefits. The question of whether flexibility in the various tax revenues can be expected to outweigh the flexibility of transfer payments is therefore an interesting one which cannot be answered on a priori grounds, but must await some quantitative results in Section 5.4.

5.4 SIMULATING INCOME GROWTH

In this section some numerical examples are used to try to identify the quantitative importance of some of the effects of indexation on tax flexibility discussed in Section 5.3. Of particular interest is the sensitivity of tax revenues to different indexation regimes and rates of real earnings growth.

As described in Section 5.2.5 a simulated lognormal distribution is used, with mean $\mu = 8.0$ and variance $\sigma^2 = 0.2$. The initial, or 'base year' value of the sample arithmetic mean, $\bar{y}$, and the coefficient of variation of gross incomes are respectively £3276 and 0.482. The same tax thresholds are used as those used in Figure 5.1, and values of c, t, and v of 0.15, 0.30 and 0.15 respectively. Although the absolute values of tax revenues will obviously be sensitive to tax rates and tax rate changes, revenue flexibility is relatively unaffected by alternative rate structures.

Income growth can then be simulated by annual growth rates of nominal incomes and prices. In this example an annual inflation rate of 5% and nominal earnings growth of 7% were used, giving 2% real earnings growth.[11] The r(q) schedule is adjusted in the manner discussed in Section 5.3.2.[12] A simulation of twenty years was used (5 years prior to, and 14 years following, the base year) giving a range of mean incomes of about £2500 to £8500.

The purpose of the results presented below is of course not to provide accurate estimates of the built-in flexibility of individual, or groups of, taxes. However, using figures which approximate recent U.K. experience, these simulations can identify, where appropriate, general conclusions on the effects of different forms of tax indexation for built-in flexibility of certain taxes. Detailed results of simulations are not therefore presented.

5.4.1 Revenue Growth without Indexation

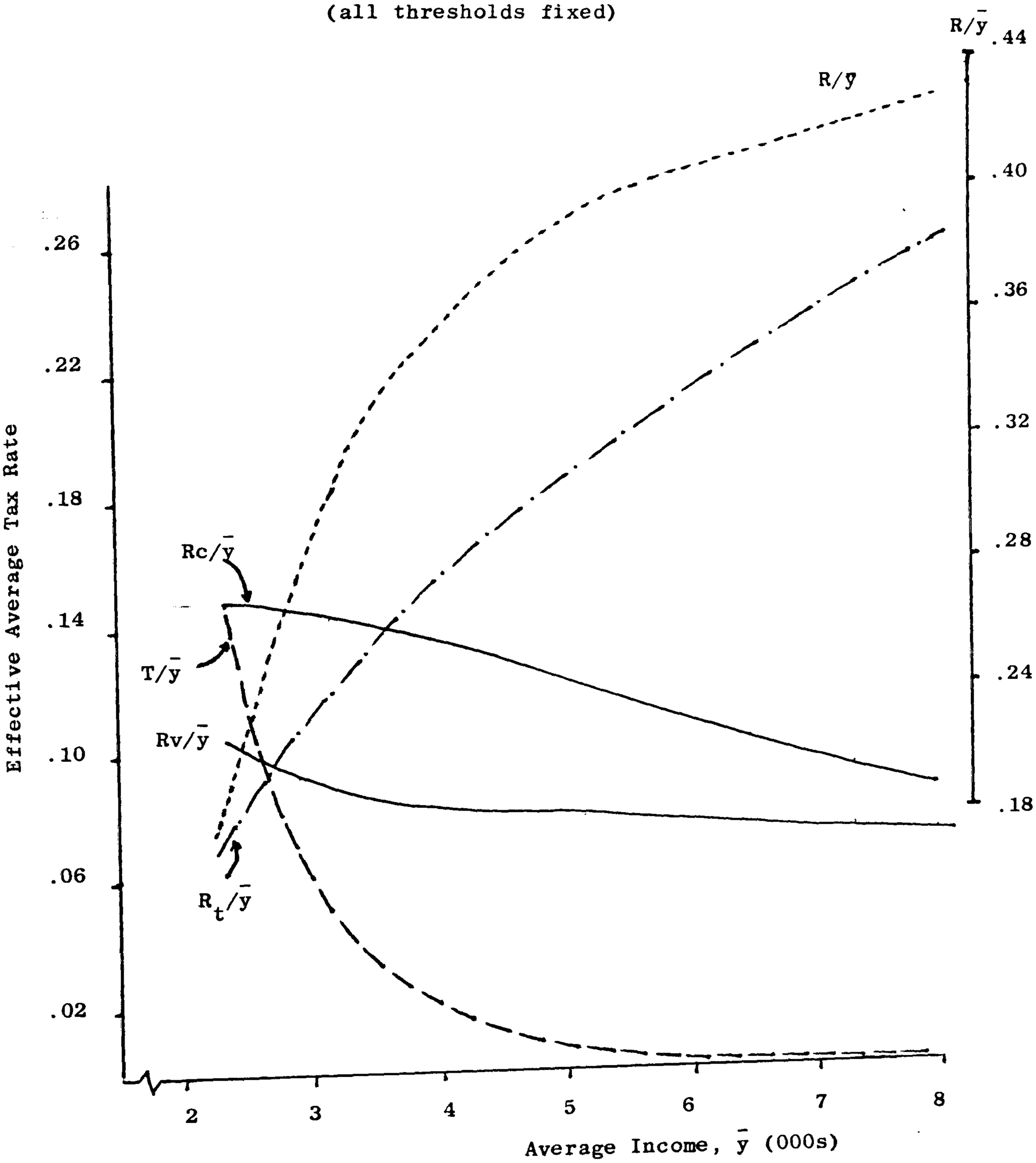
To identify generally applicable effects of indexation on tax revenues, various combinations of non-indexation, price indexation and earnings indexation of tax thresholds (a_1, a_2, Y_L, Y_U) and benefits (b) are examined. It is again useful to consider changes in tax revenue per person as a ratio of average income, $\bar{y}$, as average income changes, which measures the 'effective average rate' of tax.

Figure 5.2 shows the effective average rates (EARs) for each tax and transfer, without indexation of thresholds. It can be seen that the largest increase in EARs occurs with the income tax, which may be expected from its relatively high degree of progressivity. $R_c/\bar{y}$ declines slightly reflecting the slight regressivity of NI. The decline in the effective average rate of VAT occurs because of the decrease in disposable income, and therefore its decline lessens as the effective marginal rates of other taxes decrease (as reflected in the slopes of the EAR schedules). The r(q) schedule is being adjusted in this case but, in fact, the decline in $R_v/\bar{y}$ is only slightly increased if r(q) does not adjust with average income. Thus the built-in flexibility of VAT is dominated by the effects of changes in disposable income and adjustments in the proportion of total expenditure allocated to VAT-rated goods has relatively little effect.

Finally, in the absence of indexation, as expected the value of the effective average transfer, $T/\bar{y}$, declines but at a diminishing rate. In the range of average income between £2500 and £4000 which may be thought of as currently most 'relevant' in many developed countries it is interesting that $T/\bar{y}$ is falling fairly rapidly - from around 12% at £2500 to only 4% by £3500. The overall effect is to create a net revenue profile $R/\bar{y}$, which is broadly similar to that for income tax revenue. However the declining value of benefits serves to raise $R/\bar{y}$ particularly rapidly at lower average incomes.

FIGURE 5.2 EFFECTIVE AVERAGE RATES OF TAX

(all thresholds fixed)



5.4.2 Income Tax and NI Revenue

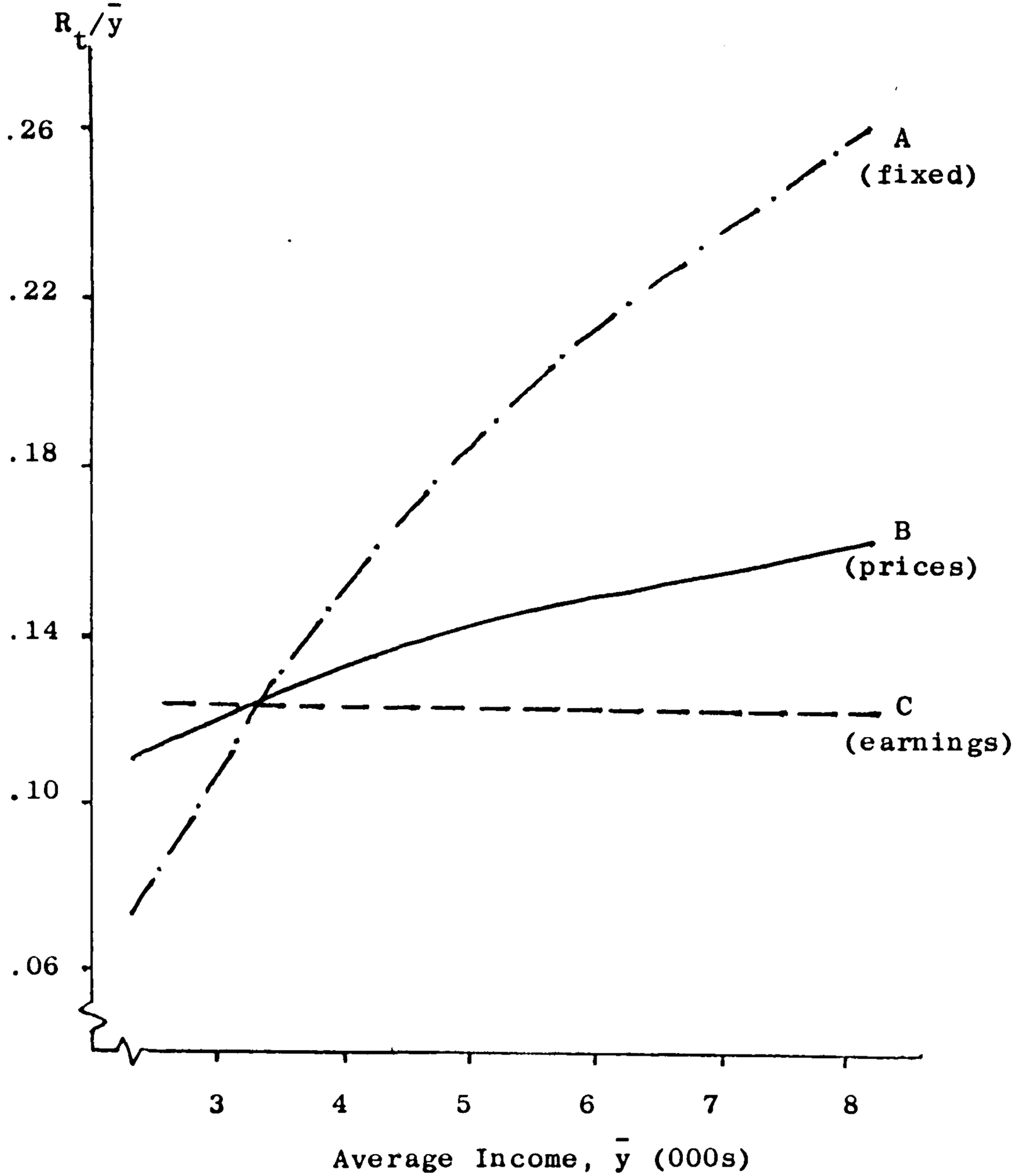
It was noted above that the built-in flexibility of NI, without indexation, was much less than that of income tax. When considering the effects of indexation to prices or earnings however, both taxes exhibit similar patterns. Firstly either form of indexation drastically reduces the flexibility of both taxes. Figure 5.3 shows that with 2% real earnings growth the slopes of the EAR profiles for both forms of indexation (B and C) are much reduced from the non-indexation case (A)[13]. These profiles show for example that equal values of $R_t/\bar{y}$ (0.125) in the base year (when y = £3276) change very differently within 5 years (when $\bar{y}$ = £4600) when without indexation $R_t/\bar{y}$ = 0.175, with price indexation $R_t/\bar{y}$ = 0.14, while with earnings indexation $R_t/\bar{y}$ is constant at 0.125. Thus the possibilities for 'automatic' increases in income tax revenue are considerably reduced by indexation. Of course, loss of NI revenue is also substantially reduced by indexation, but since the decline in NI revenue is in any case small, this effect is unlikely to be quantitatively important.

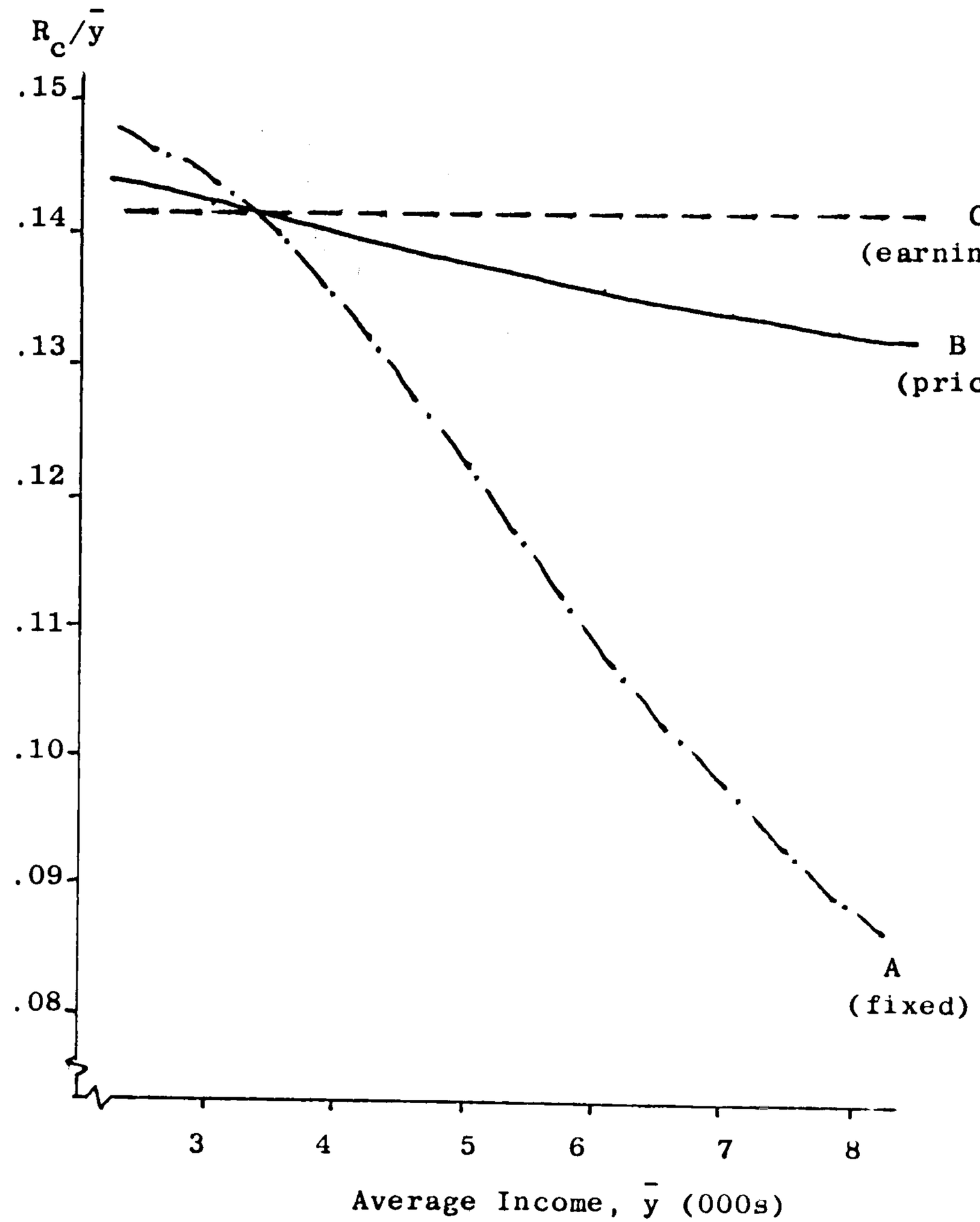
Secondly, Figure 5.3 shows sizeable differences do occur between full earning indexation and price indexation. With price indexation an increase in average income from £3276 to £4600 can raise the EAR of income tax 1½ percentage points above what would occur with earnings indexation. (The equivalent decrease in NI revenue is only 0.3 percentage points). Thus if tax authorities index thresholds to prices rather than earnings, positive real earnings growth can significantly increase income tax revenues, without any discretionary changes.

5.4.3 VAT Revenues

In section 5.3 it was suggested that VAT revenues could be expected to decline as $\bar{y}$ rises as a result of an 'income effect' due to income tax changes, and a 'redistribution effect' resulting from different

FIGURE 5.3 INDEXATION, INCOME TAX AND NATIONAL INSURANCE REVENUE





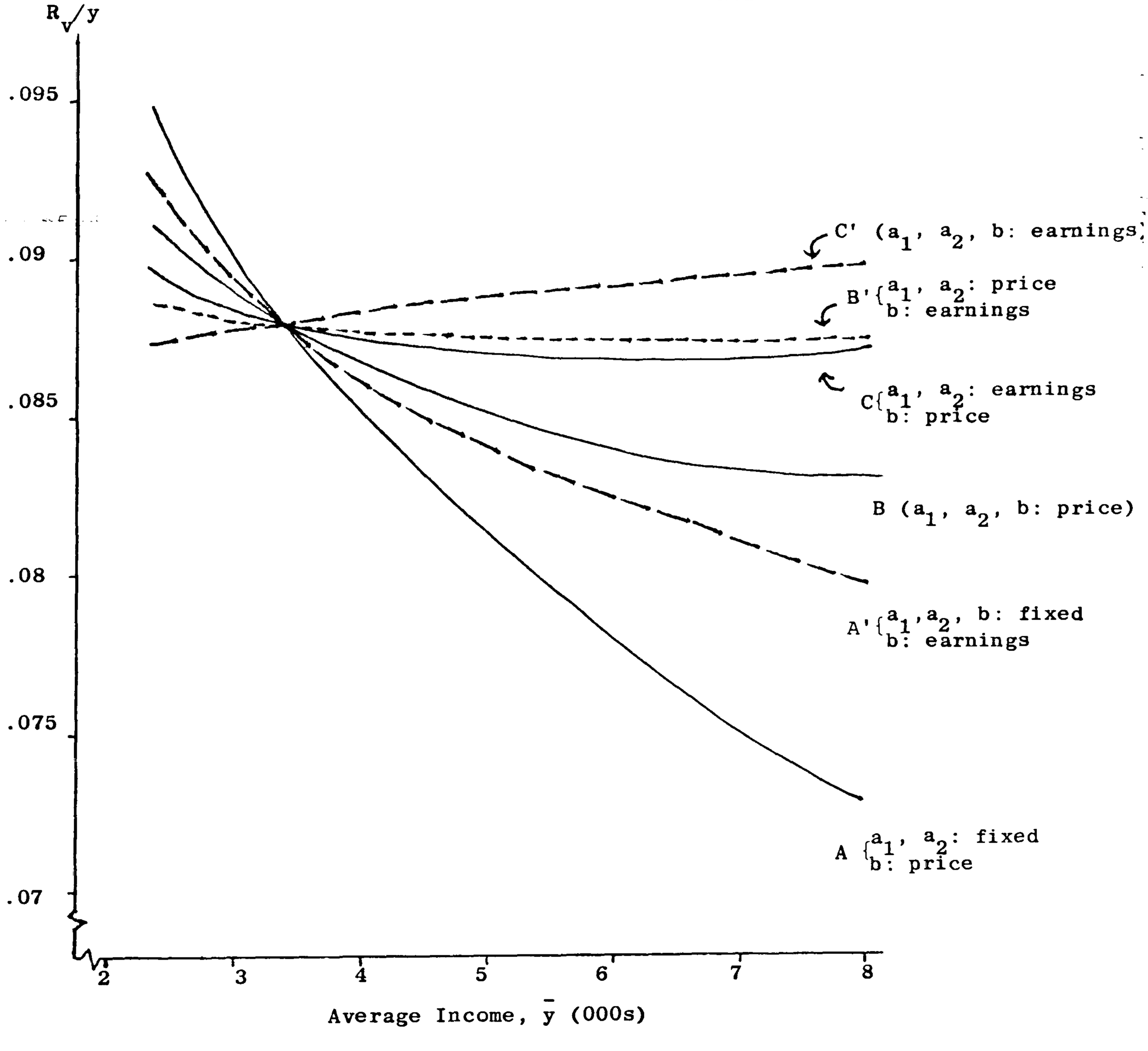
Note: fixed = relevant thresholds are fixed; prices = relevant thresholds adjust at rate of change of prices; earnings = relevant thresholds adjust at rate of change of nominal earnings.

forms of indexation of benefits. In Figure 5.2 it was shown that, without indexation, although these combined effects did not reduce VAT revenue at anything like the rate of increase in income tax revenues, nevertheless a fall in $R_v/\bar{y}$ from around 10% to 7% could be expected over the full range of incomes considered. Simulating the effects of indexing the income tax thresholds (a_1, a_2) and the benefit level (b) suggests that the magnitude of the income effect is somewhat greater than the redistributive effect of changes in b. In Figure 5.4 the (unbroken) profiles A, B and C indicate the effects of changes in income tax indexation, while keeping b indexed to prices. The (broken) profiles A', B' and C' show the equivalent profiles with b indexed to earnings.

Consider profile B where both tax thresholds and b are linked to prices. This produces a modest decline in $R_v/\bar{y}$ as $\bar{y}$ rises. It can be seen from profiles B' and C that the increase in EAR is slightly less as a result of a change in income tax indexation (C), than for a change in benefits indexation (B'). Notice that <u>for a given form of income tax indexation</u>, the increase in EAR achieved by changing benefits indexation is less the more income tax is indexed. Thus for example a change in benefits indexation can significantly increase EARs when a_1, a_2 are fixed (A to A'), but when a_1, a_2 are indexed to earnings, changing the indexation of b has much less effect on VAT revenue (C to C').

It can also be seen from Figure 5.4 that it is extremely difficult to generate an <u>increase</u> in $R_v/\bar{y}$ as $\bar{y}$ rises. Unless income taxes and benefits are indexed to earnings (which seems unlikely in practice) a decline in VAT revenue relative to average income can be expected. Finally, as expected, VAT revenue is not sensitive to the form of NI indexation since the sensitivity of NI revenue to indexation is itself slight.

FIGURE 5.4 INDEXATION AND VAT REVENUE

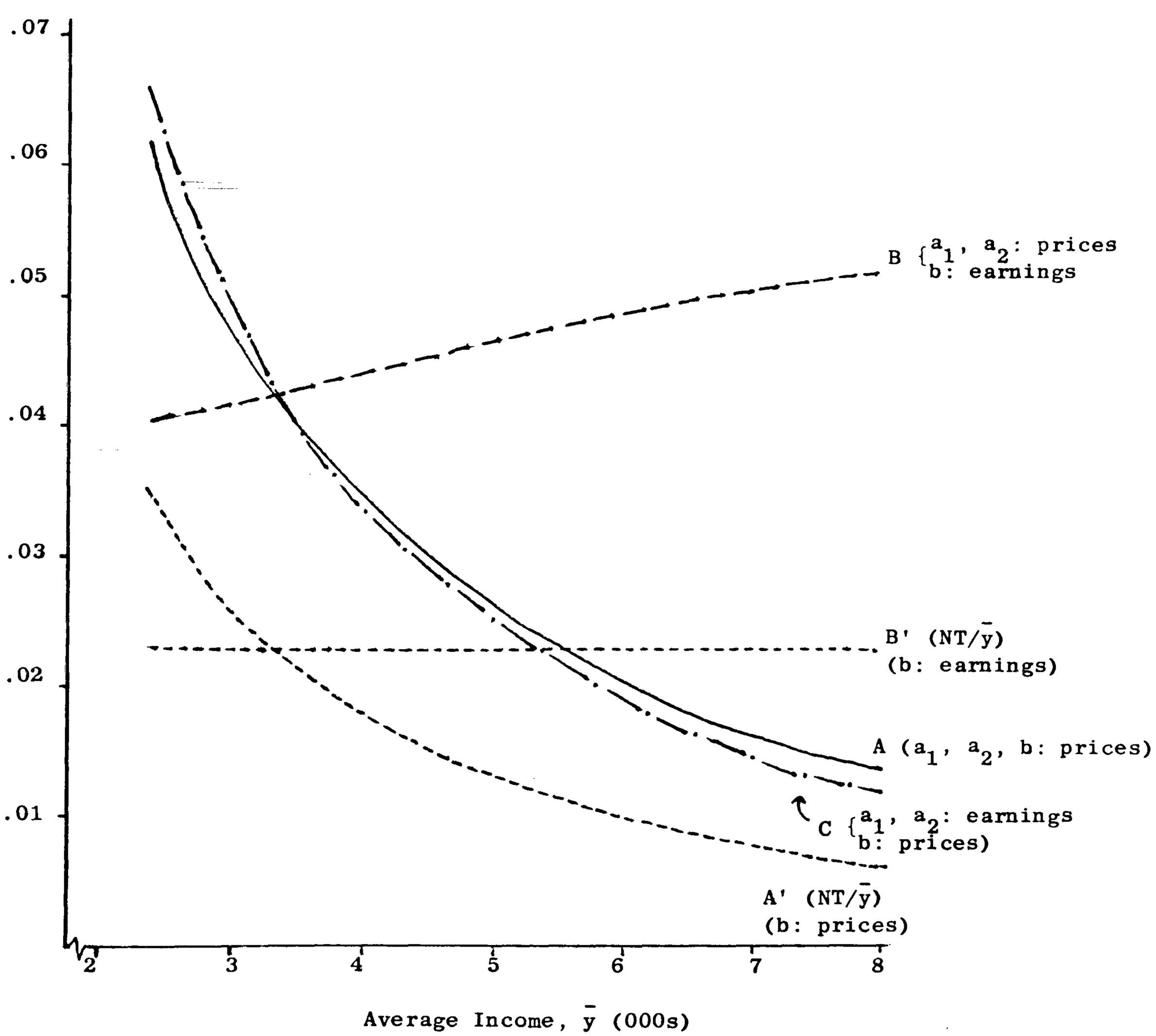


5.4.4 Transfer Payments

The extent to which the total value of transfers paid to individuals varies is important, not only to those receiving benefits, but also to the tax authorities for whom the proportion of tax revenue which is 'committed' to transfer payments is important. For distributional considerations in particular, the flexibility of net transfers is crucial. Benefits may be thought to be more 'generous' if the total value of transfers relative to average income, $T/\bar{y}$, increases, but if this is in compensation for additional taxation raised partly or wholly from those receiving benefits there may be little or no change in net transfers, $NT/\bar{y}$, and the increased generosity is illusory. In addition, governments are often concerned with the burden of 'financing' transfers. This can only relate to net transfers since any increase in total transfers which is not associated with a similar increase in net transfers must be being 'self-financed' by benefit recipients!

The results of the simulations suggest that in general the value of total transfers, $T/\bar{y}$ is sensitive to the form of indexation of b, but is not sensitive to the form of indexation of NI or income tax thresholds. Some examples are shown in Figure 5.5 With b, a_1 and a_2 all linked to price increases, transfers become less generous relative to average income (profile A), such that $T/\bar{y}$ falls from about 6% to 4% as $\bar{y}$ increases from about £2500 to £3500. (Net transfers similarly fall about 1% percentage point). Changing the indexation of income tax so that thresholds adjust with earnings (profile C) has only a slight effect on the flexibility of transfers (and no effect on net transfers), while changing the indexation of b (profile B) reverses the direction of transfers flexibility. With b linked to earnings $NT/\bar{y}$ becomes constant as $\bar{y}$ (and $T/\bar{y}$) rises, demonstrating the illusion of increased generosity. Transfers may of course still be more generous

FIGURE 5.5 INDEXATION AND TRANSFER PAYMENTS



to the extent that more individuals are eligible for transfer payments. Nevertheless it can be seen that the flexibility of net transfers is sensitive to the form of benefits indexation. With 2% real earnings growth the 1½ percentage points decline in $NT/\bar{y}$ mentined earlier, is removed by increasing the real value of benefits in line with real incomes, instead of holding real benefits constant.

The results for $T/\bar{y}$ suggest that full indexation of b to earnings can compensate those on low incomes for the built-in flexibility of income tax when tax thresholds are linked only to prices. This result is of particular interest because it shows that increases in income tax revenue due to less than full indexation of thresholds can be achieved simultaneously with improvements in the relative position of those on low incomes, if benefits are fully indexed. As with VAT however it is clearly more difficult to ensure that benefits do not become less generous than vice versa, by changing the form of indexation. That is, in the absence of discretionary action by the authorities the built-in flexibility of transfers is more likely to reduce their value relative to average income. Nevertheless it can be seen from Figure 5.5 that when $T/\bar{y}$ is declining it does so to a lesser extent as $\bar{y}$ rises. Profile B on the other hand is almost linear so that similar increases in the effective average transfer can be expected as $\bar{y}$ rises, regardless of the level of $\bar{y}$.

The upward or downward flexibility in total transfers reflects the ability of increases in the burden of income tax and NI faced by the low paid to be compensated by increases in the value of benefits. The simulations suggest that, although earnings or price indexation of a_1, a_2 have little effect on $T/\bar{y}$, non-indexation can produce significant downward or upward flexibility depending on the level of mean income

and the rate of real earnings growth. Thus for example with b linked to prices (a_1, a_2 constant and 1% real earnings growth), $T/\bar{y}$ was found to fall sharply at low values of $\bar{y}$ (below about £3000) but rise thereafter. This occurs because at low $\bar{y}$ levels, as the burden of income tax increases relatively little is born by few individuals with incomes subject to higher marginal tax rates. However as average income rises, more people pay higher marginal tax rates and account for proportionately more income tax revenue, and transfers to those with low incomes increase in relation to their tax payments. This rise in $T/\bar{y}$ only occurs at low rates of real earnings growth however, presumably because at higher rates of income growth fewer individuals are receiving benefits.[14]

Finally it was suggested in Section 5.3 that changes in the relationship between b, y_B and $\bar{y}$ could be important for policy. The simulations suggest that quantitatively these changes could be significant. It was shown in Section 5.3 that y_B will rise faster than b if a_1 is indexed less than b. In the case of profile B in Figure 5.5 indexation of benefits to earnings keeps $b/\bar{y}$ constant as $\bar{y}$ rises. However, this causes $y_B/\bar{y}$ to rise from 0.72 at £2500 to 0.76 at £4000 (reaching 0.82 when $\bar{y} \simeq 8500$). Such a rise in the income level determining eligibility for benefits relative to average income is significant both because it could be alleged to increase disincentive effects and because it occurs simultaneously with a constant 'benefit-earnings ratio', a variable commonly used to examine incentive effects on labour supply.

5.4.5 Net Revenue

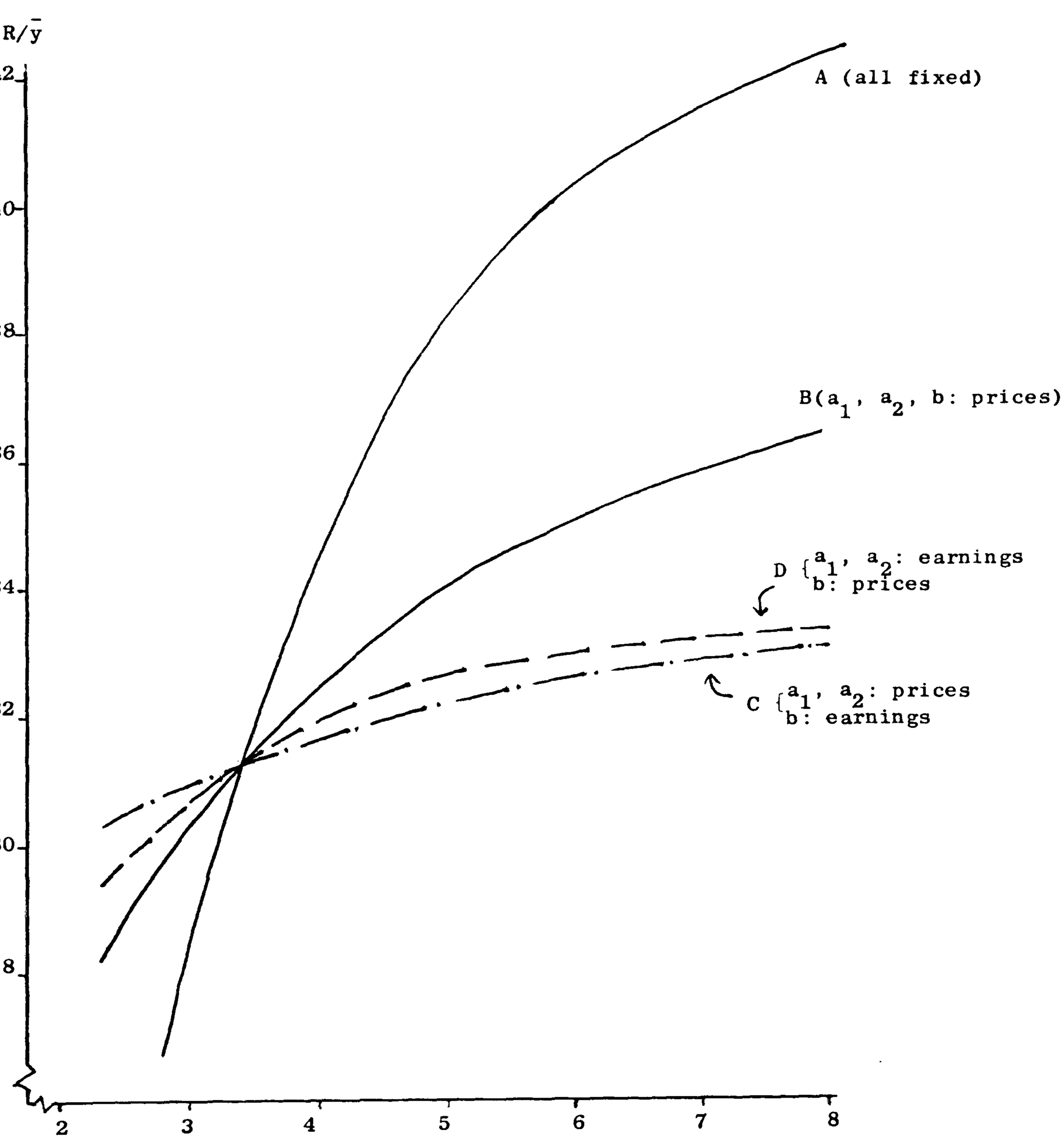
As may be expected, indexation of thresholds can substantially reduce net revenue for a given value of average income compared to the non-indexed case. Thus for example, whereas in the absence of

indexation $R/\bar{y}$ rises from about 0.24 to 0.35 as average income increases from about £2600 to £4000 (schedule A), indexation of all thresholds to prices causes the $R/\bar{y}$ schedule (B) to become much less steep, rising from 0.29 to 0.32 (see Figure 5.6). Relative to the non-indexed case alternative forms of indexation do not have very different effects on net revenue. In addition, compared to the full earnings indexation of all thresholds (giving a constant $R/\bar{y} = 0.313$) reducing the indexation of any threshold to be in line with prices can not substantially increase $R/\bar{y}$. Only non-indexation (and to a lesser extent price indexation of <u>all</u> thresholds) creates sizeable built-in flexibility.

Increasing the indexation (from prices to earnings) of income tax or benefits has a similar reductive effect on net revenues, as may be seen by the shifts from profile B to C and D in Figure 5.6. Within a currently relevant range of average incomes, differences in the indexation of benefits can be significant. With benefits linked to prices, as $\bar{y}$ rises from £2500 to £4000, $R/\bar{y}$ increases by almost 4 percentage points (0.290 - 0.328: profile B). With earnings indexation $R/\bar{y}$ increases by less than 2 percentage points (0.305 to 0.318: profile C). A loss of 2% of revenue (relative to average income) could represent a substantial revenue reduction. This would suggest that from the point of view of tax revenue it may be important for decisions on indexation of benefits to be taken in conjunction with decisions on income tax indexation.

In Section 5.3 the question of whether the flexibility of transfers could outweigh the flexibility of tax revenues was considered. It can now be seen that except with indexation of all thresholds to earnings, effective average rates of tax must rise, even if only slightly, as average income rises. This arises because maximum

FIGURE 5.6 INDEXATION AND NET REVENUE



transfer payments flexibility (which reduces net revenue) occurs with, and partly because of, maximum income tax flexibility (which considerably increases revenue). Therefore, it is unlikely that even the most generous benefits indexation could cause the EARs of net revenue to decrease.

5.4.6 Alternative Rate Structures

So far the model has been used to examine changes in tax revenue for a given set of tax rates, but allowing tax thresholds to change. The model can also be used to examine the effects of changes in tax rates on total tax revenue at alternative average income levels. Some implications of varying the three rates are shown in Figures 5.7, 5.8 and 5.9 for t, c and v respectively, with average income fixed at £3276. The parameters of the various schedules, other than the rates, are again the same as those used in Figure 5.1.

A very convenient property of the relationship shown in each of the three figures is that, except in the case of R_v in Figure 5.9, they are linear. That R_t is linearly related to t, and R_c to c, is of course clear from the schedules used. It is not however obvious that R_v and T are linearly related to t and c. An increase in the standard rate of income tax, which carries with it the implication that transfers to the low paid are also less generous, reduces disposable income and therefore total VAT payments, for any given VAT rate. However increases in the rate of VAT clearly have a large effect on total revenue, R_v (as seen in all three figures).

Increases in the NI contributions rate can be seen in Figure 5.8 to reduce R_v and T only slightly relative to the increase in R_c. Thus, as with income tax, sizeable rises in net revenue may be expected from increases in the National Insurance rate.

FIGURE 5.7 VARIATIONS IN THE STANDARD RATE OF INCOME TAX

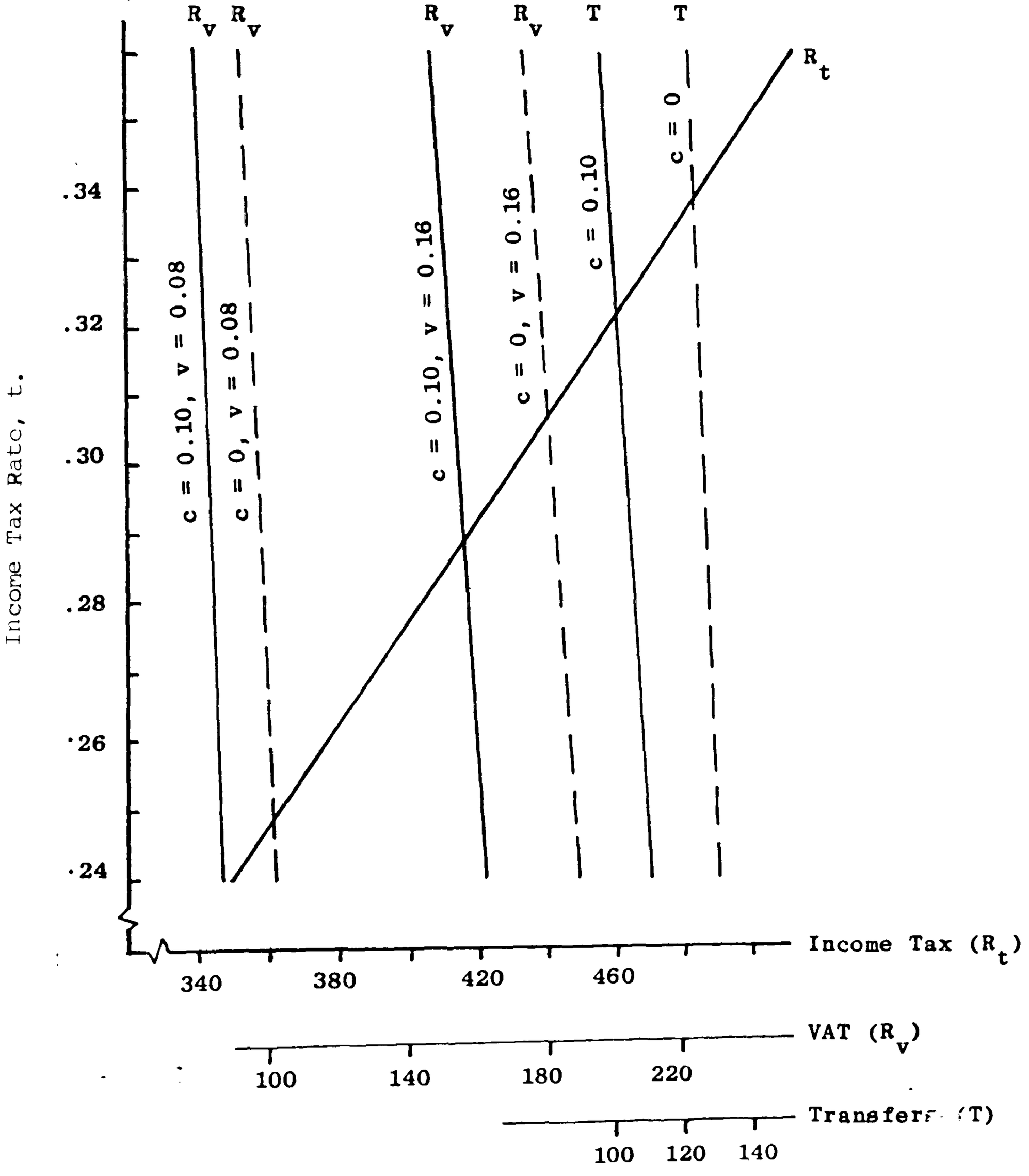


FIGURE 5.8 VARIATIONS IN THE NATIONAL INSURANCE CONTRIBUTIONS RATE

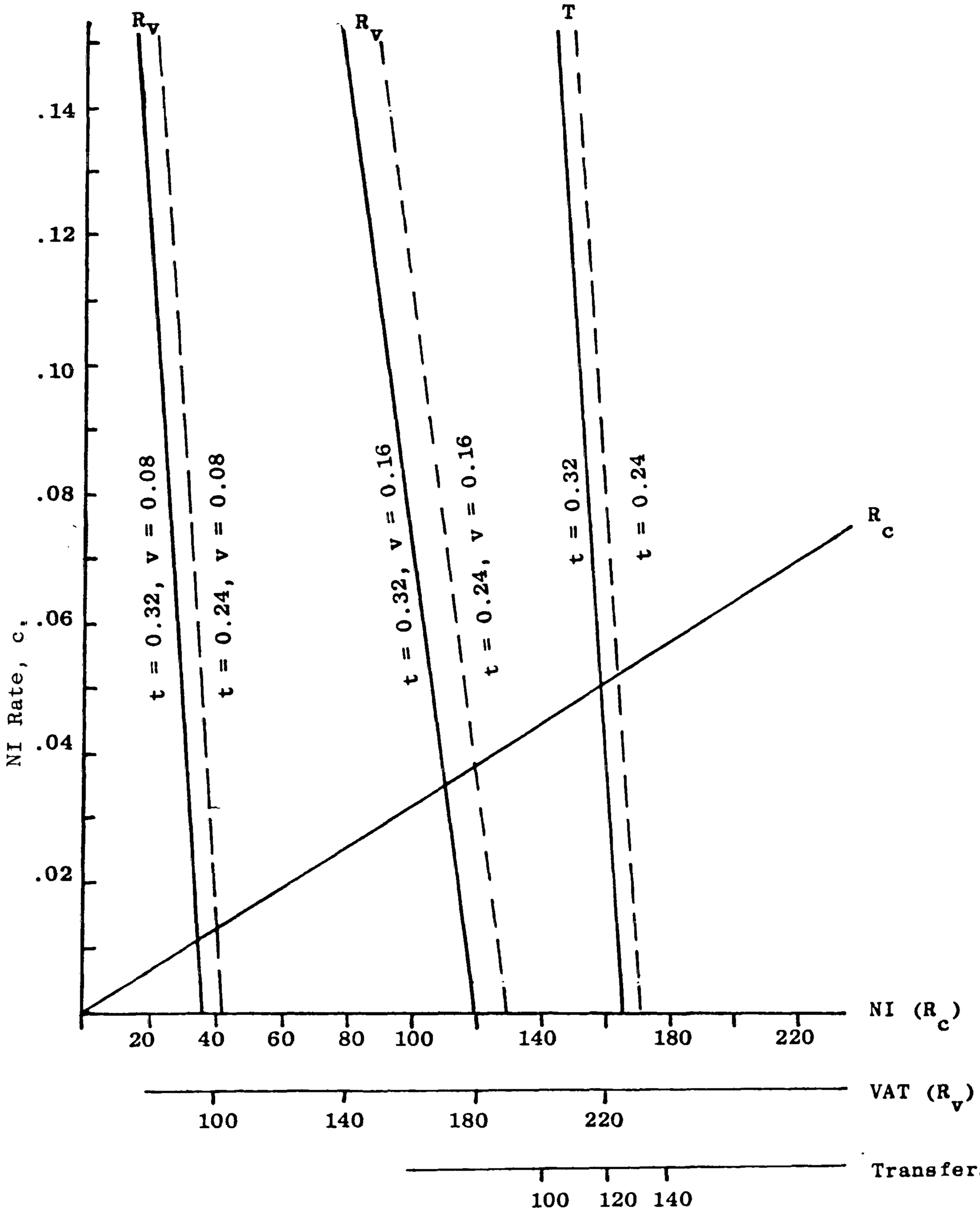
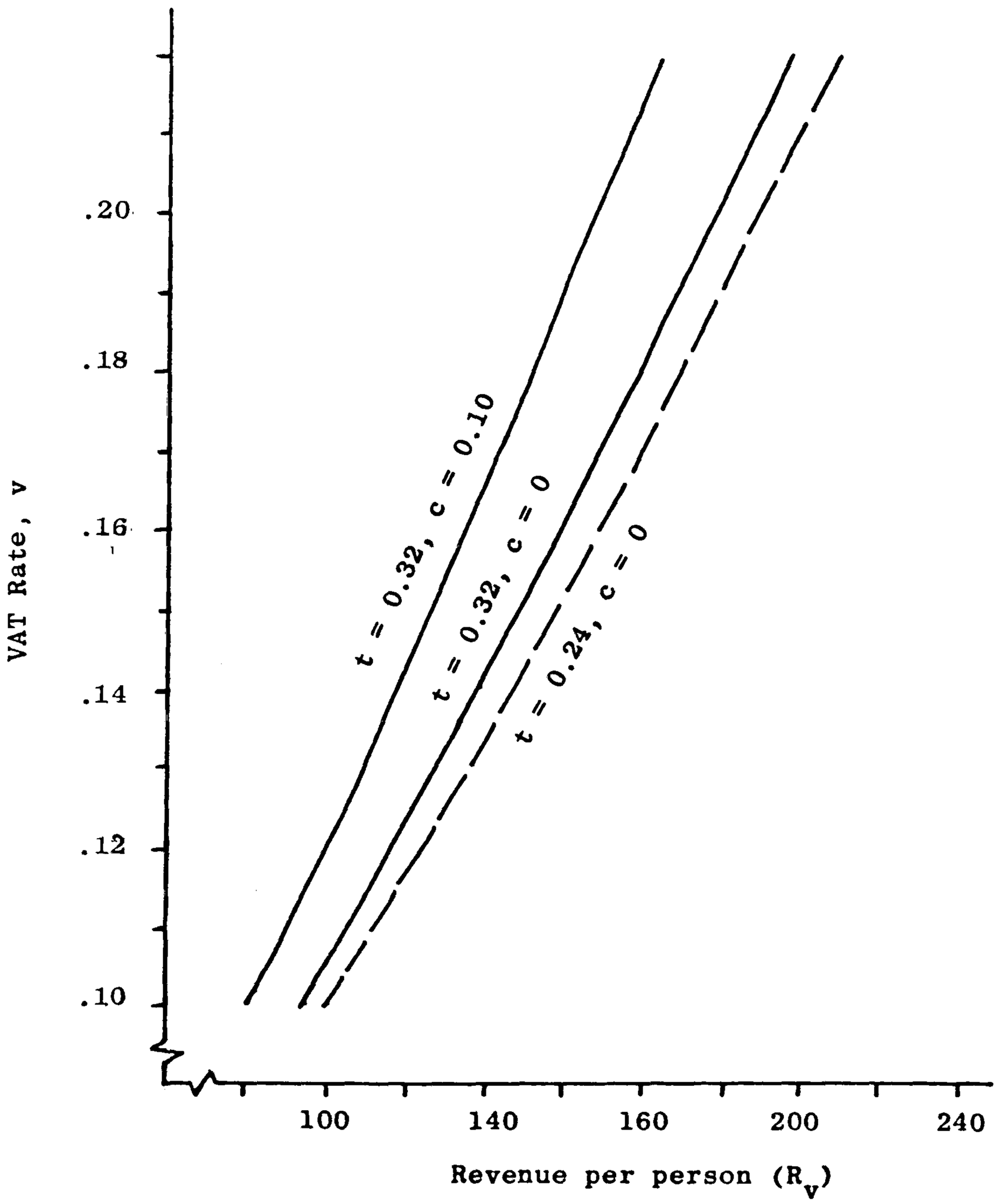


FIGURE 5.9 VARIATIONS IN THE RATE OF VALUE ADDED TAX



Changes in parameters other than rates of course also affect the revenue schedules, and can be examined using the present model. Raising the NI upper earnings limit to £8000 (from £5000) makes NI almost a directly proportional tax. Total National Insurance revenue is however only slightly increased. Reducing the tax threshold a_1 to £1500 substantially increases income tax revenue and slightly reduces its responsiveness to tax rate changes.

Finally consider a rise in both the gross income level below which transfer payments are received, y_B, and the tax threshold, a_1, to £2500. This increase in a_1 avoids tax payments by those receiving sizeable transfers. The combined increase in y_B and a_1 obviously reduces net income tax revenue and increases VAT revenue. In fact R_t is found to fall substantially but only a small increase in R_v is recorded. There are of course many relevant combinations of parameter changes which can be simulated, but these examples serve to show that the final effects on tax revenue of such parameter changes can be large.

5.5 SUMMARY AND CONCLUSIONS

This chapter has examined how revenue from a tax system of direct and indirect taxes can be expected to change in the presence of income growth. A model of interdependent taxes was used including income tax, National Insurance, value added tax and a simplified system of income transfers to the low paid taking the form of a guaranteed minimum income. These components are common features of many tax systems but the model used specific tax forms and parameter values which approximated the U.K. system. Using a simulated lognormal distribution of incomes in conjunction with the tax functions, results were obtained for tax revenues for alternative values of average income.

It was argued in Section 5.3 that revenue growth for particular taxes in an interdependent system will be affected, not only by the extent of the adjustment of thresholds for the tax concerned, but also by the adjustment of the thresholds of other taxes. It was shown that in the U.K. tax thresholds and benefit levels have tended to be adjusted by some form of indexation to price or nominal earnings changes. To enable comparisons of revenue growth under different indexation assumptions, three forms of indexation of thresholds and benefit levels were used: fixed, adjustment at the rate of growth of prices, and adjustment at the rate of growth of nominal earnings.

The results obtained in Section 5.4 allow some general observations to be made on the effects of economic growth on revenue from the tax/transfer system. It was shown that without any indexation of thresholds substantial increases in income tax revenue (as a proportion of average income), $R_t/\bar{y}$ accompanied increases in average income, for given tax rates. Conversely the total value of transfers fell rapidly as a proportion of average income. National Insurance and VAT revenues however displayed relatively little built-in flexibility being only

slightly regressive and progressive taxes respectively. The income tax flexibility dominates the flexibility of the tax system as a whole and therefore total tax revenue flexibility was found to be broadly similar to that of income tax.

A common feature of the various tax revenue schedules was that indexation (to either prices or earnings) substantially reduced revenue flexibility. This occurred at what may be regarded as fairly modest rates of price and earnings growth (5% and 7% respectively) by recent historical standards. Most revenue schedules also displayed a tendency for revenue to change rapidly at low values of $\bar{y}$, but schedules 'flattened' considerably at higher $\bar{y}$ values. This would seem to indicate that for countries with low per capita income levels, given this type of tax structure, revenue flexibility is likely to be much greater than the flexibility of a similar structure in more developed countries.

Thirdly, it appears to be difficult to generate increases in VAT revenue as incomes grow. While VAT revenue is sensitive to different forms of indexation of income tax and transfers, the unlikely combination of earnings indexation of income tax thresholds and transfer payments is required, to produce a rising VAT revenue schedule. A similar phenomenon occurs with transfer payments. If the benefit level, b, is indexed to earnings, total transfers paid can rise as a proportion of average income. However this only occurs if income tax thresholds are indexed at less than the rate of growth of earnings, and net transfers as a proportion of average income will, at best, remain constant. Further it was found that indexation at less than earnings growth, especially of the benefit level produces sizeable falls in $T/\bar{y}$ and $NT/\bar{y}$. Therefore if 'poverty' relief is to be maintained, while the real burden of taxation rises, (because of, for example, the built-in

flexibility of income tax) discretionary action is required to adjust benefit levels or other social security variables.

Finally total (net) revenue was found to rise relative to average income as incomes grew even if some tax/transfer thresholds were indexed to earnings. Obviously if all thresholds were indexed to earnings there is zero flexibility but it was found that earnings indexation of either income tax thresholds or transfers can still be expected to significantly increase net revenue as incomes rise, and especially at lower average income levels. For the same reason net revenue is most sensitive to income tax and transfers indexation, but fairly insensitive to indexation of VAT and National Insurance.

These results, while derived from a model of a specific tax system, are useful for analyses of other tax systems. The income tax schedule for example was shown in chapter 4 to be very flexible and hence readily applied to alternative income tax structures. Social insurance taxes similar to the National Insurance system are used in many countries, (including Egypt; to be discussed in chapter 10). The model can incorporate if necessary a progressive social insurance tax (making it more like income tax) and can accommodate the additional interdependence where the tax base for the social insurance tax is post-income tax income.[15] Thus this method of modelling tax revenue growth can be applied to various tax systems in use. It can identify in particular the consequences of differing interdependencies between taxes and indexation policies, for the flexibility of tax revenues. This is clearly of importance for countries experiencing structural changes involving a growth of the public sector which is financed from public revenues.

Footnotes

1. Commodity-specific taxes, which are used in many countries in addition to a general expenditure tax, are not included in the present model. The model could however be extended to include such taxes using information on the distribution of consumption of particular commodities.

2. It is difficult to determine the extent of variations in tax allowances between households of a specified type in the U.K. While it is likely that mortgage payment allowances, for example, increase with income for a given household type, modelling the distribution of other tax-allowable expenditure is more difficult. The extent of this problem is likely to vary across countries.

3. The schedule in (5.2) refers to those who are fully contracted into the State pension scheme. Partial contracting out raises considerable difficulties, and is therefore not examined below, although an important feature is discussed in Creedy and Gemmell (1984).

4. For details of the U.K. system see any issue of Social Trends. Some benefits are received in kind, rather than as a cash transfer, and the time period over which benefits are received varies, but the marginal 'effective' tax rate is approximately 100% over a range of lower incomes.

5. For example, the legislation requires that the NI upper earnings limit is approximately 7 times the lower limit, and that the former is about 1½ times average earnings. Other values have been set accordingly.

6. Thus if the mean and variance of the logarithms are μ and σ^2 respectively, a set of values of y_i ($i = 1 \ldots N$) may be obtained

using a set of random Normal deviates, u_i (i = 1 . . . N). With $u_i=(\log y_i - \mu)/\sigma$, each value of y_i is calculated using $y_i = \exp.(\mu + \sigma u_i)$.

7. Experiments with different sample sizes showed that a sample size of 1000 is more than adequate for present purposes, in order to avoid significant sampling variation. The sample arithmetic mean and coefficient of variation of gross income are £3276 and 0.482 respectively.

8. VAT revenue could of course be increased by reducing the numbers of exempt goods. In line with U.K. practice, a fixed set of exempt goods are used here.

9. In fact the adjustment of the r(q) relationship produces only a small effect on the built-in flexibility of VAT revenue, compared to a non-adjusting r(q) relationship.

10. It may be noted that this effect would hold even in the presence of differing savings propensities across income groups.

11. Clearly it is the <u>difference</u> between the rates of growth of nominal incomes and prices which is important for the simulations. The values of each growth rate are only important for comparisons of indexed and non-indexed simulations.

12. α is adjusted such that

$$\log \alpha = \log r_{\bar{q}} + 0.34 \log \bar{q}$$

where $r_{\bar{q}}$ is the value of r at $\bar{q}$ which was found to be approximately constant (0.452). β is constant at 0.34.

13. It can be seen in Figure 5.3 that income tax revenue prior to the 'base year' ($\bar{y}$ = £3276) is less with price or no indexation than with earnings indexation. This occurs because in simulating earlier years with positive real earnings growth, threshold indexation at

less than the rate of growth of nominal earnings will raise tax thresholds relative to average income, $\bar{y}$, and hence reduce revenue. For the same reason, with a regressive tax such as National Insurance, revenue at income levels below the base year is greater when thresholds are indexed at less than the rate of growth of nominal earnings.

14. This phenomenon does not occur with net transfers, NT/y declining secularly as $\bar{y}$ rises.

15. In Egypt, for example, the tax base for the General Income Tax is gross earned income less all other 'income' tax payments including social insurance. See chapter 10.

P A R T 3

STRUCTURAL CHANGE IN EGYPT, 1960-75

In the third part of this thesis the analyses developed in Part 2 are applied to the Egyptian economy. It was noted in chapter 2 that several LDCs have experienced structural changes which have been heavily towards service activities. Most are in Latin America and have received more attention in previous research. In Egypt however, despite a long history of growth in its service sector (see chapter 6) there has been little attention devoted to this sector's development. There have of course been previous studies of structural change in Egypt (of which Mead (1967) is perhaps the best known) but these have tended to concentrate on resource shifts from agricultural to industrial activities.

In chapter 6 the extent of differences in the size and growth of industrial and service sectors in Egypt over the period 1960-75 is examined and this is compared to other countries' recent performance using the results from chapters 2 and 3, and to Egypt's own earlier historical experience. Using data on employment, chapters 6, 7 and 8 then seek to identify underlying influences behind the structural changes towards services. First, regression analysis is used in chapter 7 to 'explain' employment growth in different sectors. An alternative methodology, using output and productivity differences across sectors is then adopted. This suggests a more disaggregated examination is required, which is pursued in chapter 8.

Some consequences of the growth in Egypt's non-market sector are considered in chapter 9 using the framework of chapter 3.

A lack of suitable data prevents the tax models developed in chapters 4 and 5 being rigorously applied to Egypt. However in chapter 10 some aspects of tax development in Egypt are examined, and the results of the tax models in Part 2 are used to shed some light on the growth of tax revenues in Egypt.

C H A P T E R 6

STRUCTURAL CHANGE AND EMPLOYMENT GROWTH

6.1 INTRODUCTION

The structure of, and structural changes in, the Egyptian economy have been of interest to economists for many years. The development of the cotton industry in Egypt has long been recognised as a source of 'unbalanced' growth and has been studied extensively by, for example, Issawi (1961) and Owen (1969). The growth of the industrial sector overall was the subject of a detailed investigation by Mabro and Radwan (1976), while on structural changes generally Mead (1967), Mabro and O'Brien (1970) and Mabro (1974) have examined resource shifts, involving mainly the agricultural and manufacturing sectors, up till the late 1960s. Using census information Mead (1967) was able to study the development of some services to 1960, but since then, despite widespread recognition of service growth, this sector, and the reasons for its relative growth have not been studied in detail.

In order to study the growth, relative and absolute, of economic sectors it is of course necessary to decide on a measure of growth. In chapter 2 it was suggested that for international comparisons, employment often represented a better measure than output because of such problems as data collection and exchange rate variations. In addition there are well known difficulties associated with measuring service sector output, particularly in the non-market sector. Since in most countries' national accounts non-marketed outputs are estimated from wage and salary payments it is difficult to distinguish 'output' from 'input', and productivity in this sector is therefore difficult to measure. This is also the case in Egypt. In this study therefore, employment is the variable used to measure the size and growth of each sector and it is employment structure which it is sought to explain. Of course economic theory on, and empirical investigations of, employment structure have often identified output or productivity as

important explanatory variables and in the following chapters it is necessary to use data on sectoral output and productivity. For the service sector in particular these data must therefore be interpreted with care.[1]

In the following chapters two classsifications of service and industrial activities are used. In this chapter, to enable comparisons with earlier results, agricultural, industrial and service sectors are defined as in chapter 2, where the industrial sector includes only manufacturing and the service sector is defined, using the 1968 ISIC as transport, communications, finance, wholesale and retail trade and community, social and personal services. In chapters 7 and 8, the approach adopted is to compare all 'service-producing' sectors (and two sub-sectors, 'commercial' and 'social' services), with the 'goods-producing' sector. This approach, first used by Fuchs (1965), while obscuring the details of trends in sub-categories, does enable any general and systematic differences between goods and service sectors, which economic theory suggests may exist, to be identified. Although there are some economic activities which could be classified in either category, (depending on the criteria used) in most cases activities fall clearly into one category.[2] In this study the goods sector is defined to include agriculture, manufacturing, mining and quarrying, electricity, public utilities, construction and housing. (The non-agricultural goods sector is also used for comparisons and is denoted, 'goods*'). The service sector includes 'commercial services' (CS) - transport and communication services, financial services, wholesale and retail trade; and 'social services' (SS) including education, health, government administration and personal services.[3]

The chapter is set out as follows. In Section 6.2 evidence on structural changes for 1960-75 is presented and examined. This is compared to international evidence on structural change and to changes since the early years of the twentieth century. Section 6.3 considers factors which economic theory and previous investigations in other countries have suggested are important explanations of sectoral differences in employment growth. Possible explanations specific to Egypt are also considered. Some of the variables suggested in Section 6.3 are tested in chapters 7 and 8.

6.2 EMPLOYMENT EVIDENCE, 1907-75

6.2.1 The International Position

In chapter 2 it was argued that fairly clear patterns of structural change across countries could be found for agricultural, industrial and service sectors. While some countries deviated substantially from those patterns (e.g. Argentina, Brazil) there was nevertheless a degree of uniformity among a sample of developed and less developed countries. Regression results on these patterns were obtained excluding the Egyptian economy so that it is interesting to compare the structure of Egypt's employment with the international patterns.

Table 6.1 shows the division of employment in Egypt between agricultural, industrial, service and social service sectors in 1960 and 1970. These are compared with the sector shares which are predicted from the international regressions, given the share of employment in agriculture in Egypt in each year. Thus a country with an employment share in agriculture of 54% is predicted to have about 13% and 23% of its employment in industry and services

TABLE 6.1 SECTOR EMPLOYMENT SHARES, 1960 AND 1970

Year		Agriculture	Industry	Services	Social Services
1960	actual	0.540	0.100	0.287	0.178
	predicted*	-	0.128	0.230	0.157
1970	actual	0.489	0.111	0.330	0.191
	predicted*	-	0.142	0.255	0.168

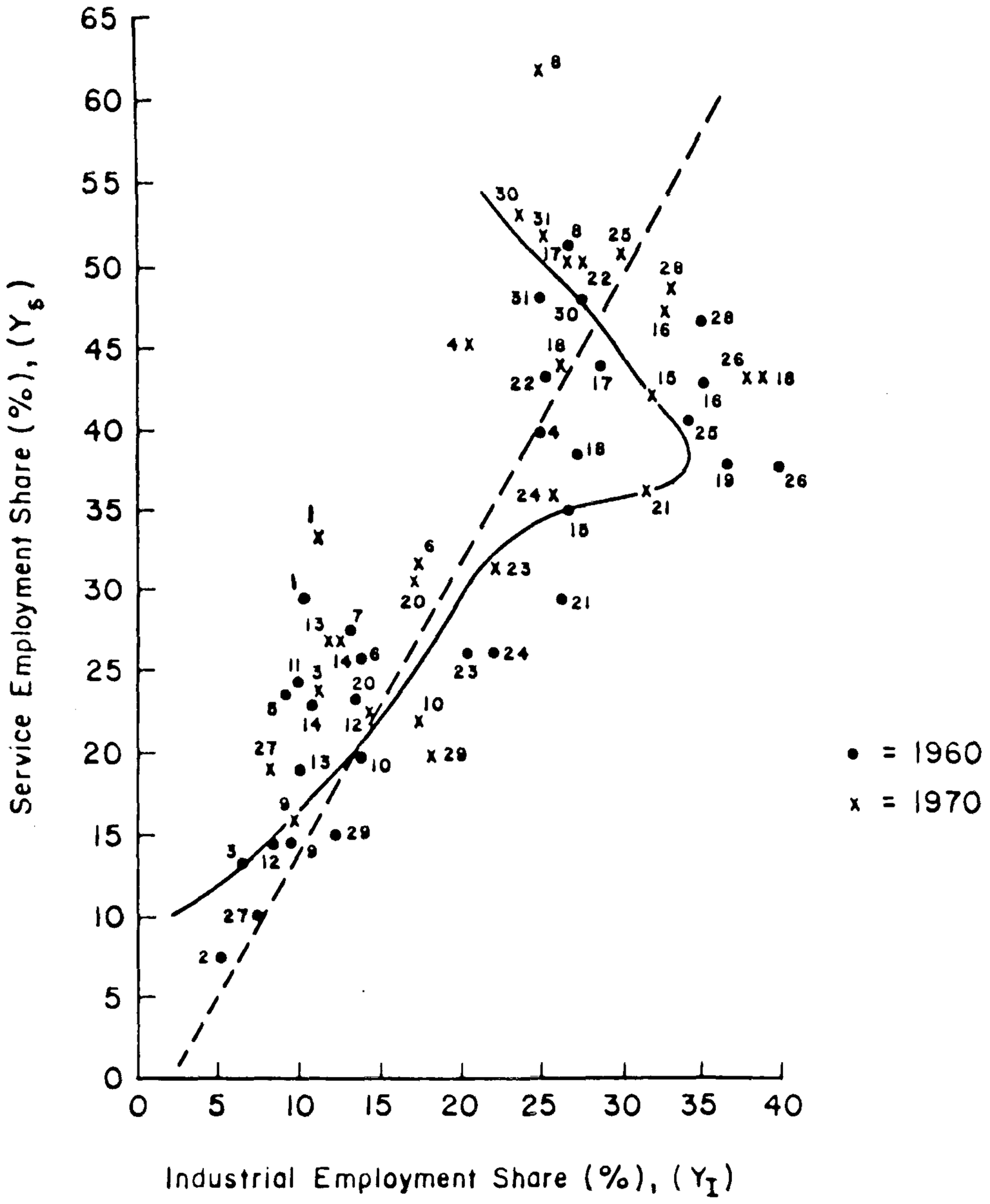
* predictions are calculated using equations (i), (ii) and (iii) in Table 2.1(A).

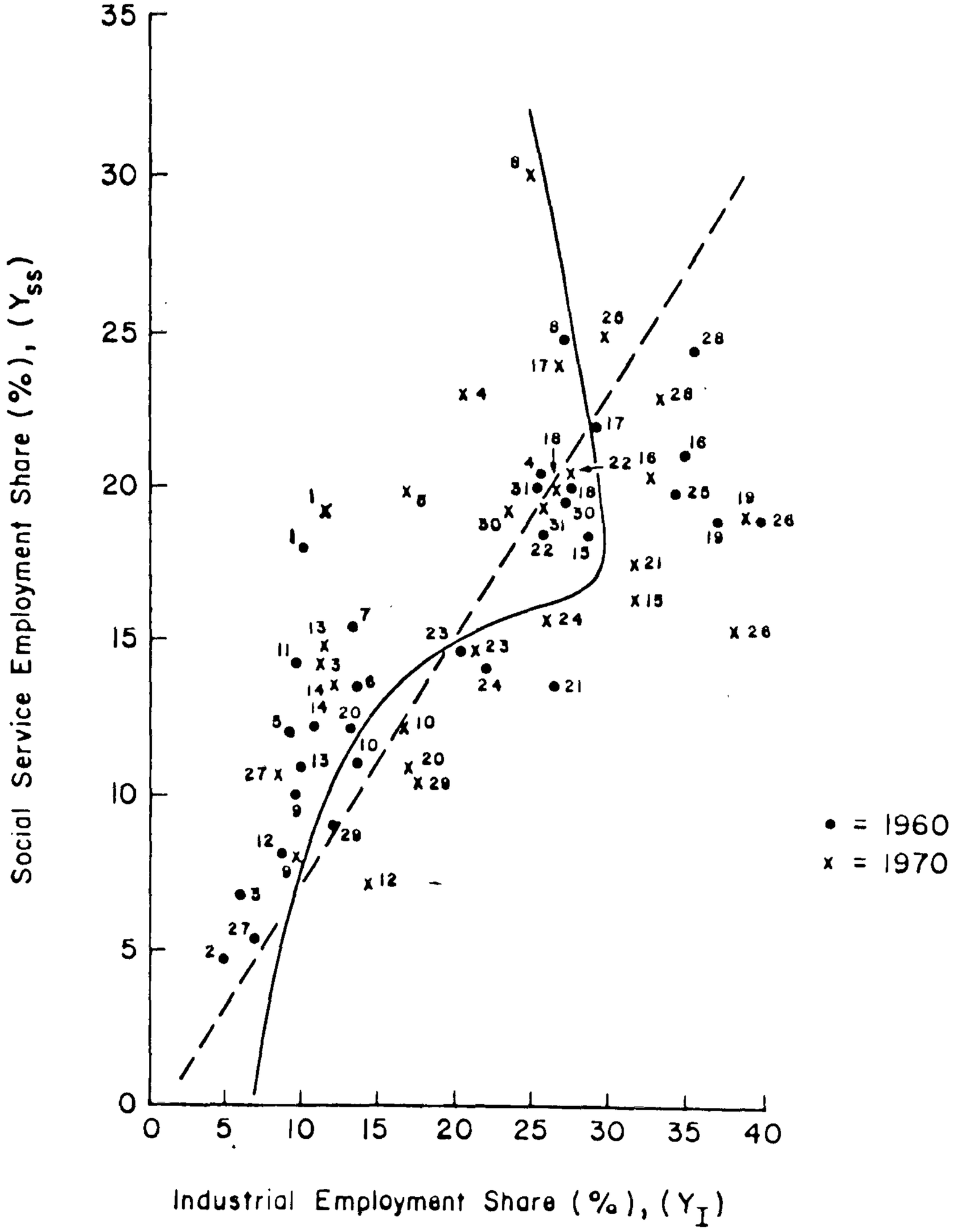
respectively. Social services should make up about 16% of the 23% in services. In Egypt however industry in 1960 took only 10% of employment, but services absorbed almost 29%. Social services are also more than predicted at almost 18%. Ten years later, in 1970, with a lower employment share in agriculture, Egypt's employment shares in other sectors are all predicted to be higher, as expected. Actual figures are higher for all sectors also, but again the service sector is much higher than predicted (33% as against 25% predicted) while industry continues well below predictions.

Of course, domestic factors in particular countries, will almost always ensure that in an international comparison, some countries lie below and some above the predicted pattern.[4] However comparing Egypt's sector shares with the international sample in chapter 2, Figure 2.5 shows that Egypt's low industrial share is similar to those less developed countries with the greatest (negative) deviation from the predicted relationship. Egypt's service employment share is considerably above those LDCs which deviate most above the predicted pattern (see Appendix 6.1).[5] A comparison of service, social service and industrial employment shares is given in Figure 6.1. This reveals the extent to which Egypt's total and social service sector employment shares (number 1 in each diagram) are in excess of other countries' in the sample, given the size of its industrial sector. Egypt's social service sector in 1970 takes a similar share of employment as such industrialised countries as West Germany, Norway and Australia.

This evidence would seem to suggest that the structure of employment in Egypt, though not unique in its bias away from industry and towards services, is especially unusual by international standards. The particularly large size of social service employment

FIGURE 6.1 EMPLOYMENT IN INDUSTRIAL, SERVICE AND SOCIAL SERVICE SECTORS, 1960 AND 1970.





by international standards is also associated with rapid growth during the 1960-1970 period. Chapter 3 provided evidence on the growth of market and non-market sector employment for an international sample including Egypt. (For the data used here the non-market and social service sectors are, of course, identical). This confirmed that, relative to the growth of marketed output, Egypt experienced one of the largest expansions in market and non-market employment, 1960-70.

6.2.2 Historical Evidence

Having obtained some idea of the structural balance in the Egyptian economy in an international context, Egypt's structural balance during the period 1960-75 may be examined in comparison with its earlier economic experience. In particular, it is of interest to know if the imbalance identified in 1960 and 1970 is a phenomenon which developed fairly quickly prior to 1960, perhaps as a result of the upheavals following the 1952 Revolution, or if it existed over a longer period of Egyptian economic history.

Table 6.2 below shows the sectoral breakdown of employment for various years since 1907. Figures for 1907-1960 are from population censuses and those from 1960* onwards are from official annual employment estimates. The period 1960 to 1975 is divided into three sub-periods, 1960-65, 1965-70 and 1970-5, corresponding approximately to Egypt's five year economic plans.[6] A full set of data for 1975-80 is not yet available.

It can be seen that the share of employment in agriculture has been falling at least since 1937. Whether or not the decline began before this (and 1937 represents a temporary upturn), is difficult to ascertain, but in either case it is clear that a significant decline only began after 1937 . The share of services however appears to grow from 1907 and particularly after 1937, while industry's

TABLE 6.2 SECTORAL SHARES OF EMPLOYMENT: EGYPT 1907-75

Sector	1907	1917	1927	1937	1947	1960	1960*	1965	1970	1975
Agriculture	68.2	68.0	67.4	69.5	61.6	56.3	54.0	50.9	48.9	44.7
Industry	8.3	8.4	8.2	6.2	8.6	9.4	10.0	11.2	11.1	12.7
Services	20.7	22.0	22.3	22.0	27.8	31.9	32.0	32.3	33.0	35.6
: Social Services	13.0	10.9	9.8	12.0	15.8	20.4	17.8	18.6	19.1	20.5

* Figures obtained from labour force sample surveys. Subsequent years are also obtained from this source.

Source: 1907-60; D. Mead (1967)

1960-75; C.A.P.M.S., Statistical Yearbook of the U.A.R., Cairo, various issues.

share of employment is fairly steady in the first quarter of the century, falls in 1937, and only begins to rise after that date. It is interesting to compare the changes in employment shares in Egypt over the period, with the international patterns discussed in Section 6.2.1. These are shown in Figures 6.2 and 6.3.[7]

Figure 6.2 shows that until 1927 the share of industrial employment relative to agriculture is close to that predicted from the international sample, but after that date industry's share begins to fall below predicted values. The deviation appears to increase slowly up to 1975, (apart from a slight fall in 1965) but there can be no doubt that the shortfall in industrial employment began as early as 1947. The situation regarding the share of services relative to agriculture is somewhat different. The excessive size of the service sector in Egypt, when compared to the regression equation, seems to have existed as early as 1907, but once again, the gap increases mostly between 1937 and 1960, falling back slightly by 1975. The result is that the share of services relative to industry has increased since 1907 (see Figure 6.3) but particularly from 1937 to 1960.

The share of employment in social services vis à vis agriculture and industry is similar to that of total services. There are particular problems of data comparisons between the pre- and post-1960 periods for the social service sector, but assuming that it is legitimate to compare within each period it appears that the deviation of the Egyptian economy from the international industry/social services relationship, which began between 1927 and 1937 has increased still further between 1960 and 1975.

FIGURE 6.2 INDUSTRIAL AND SERVICE SECTOR EMPLOYMENT SHARES: EGYPT 1907-75

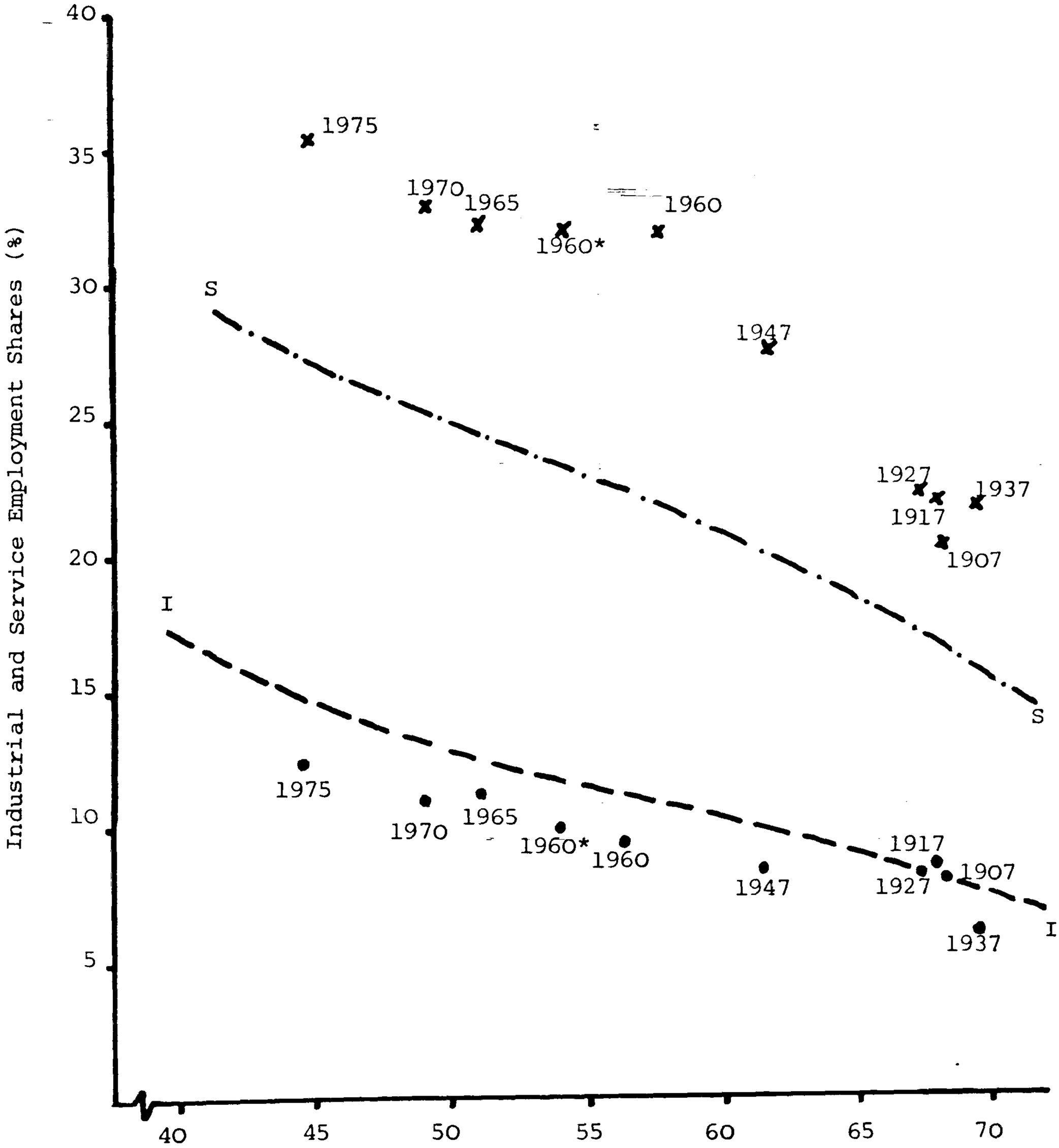
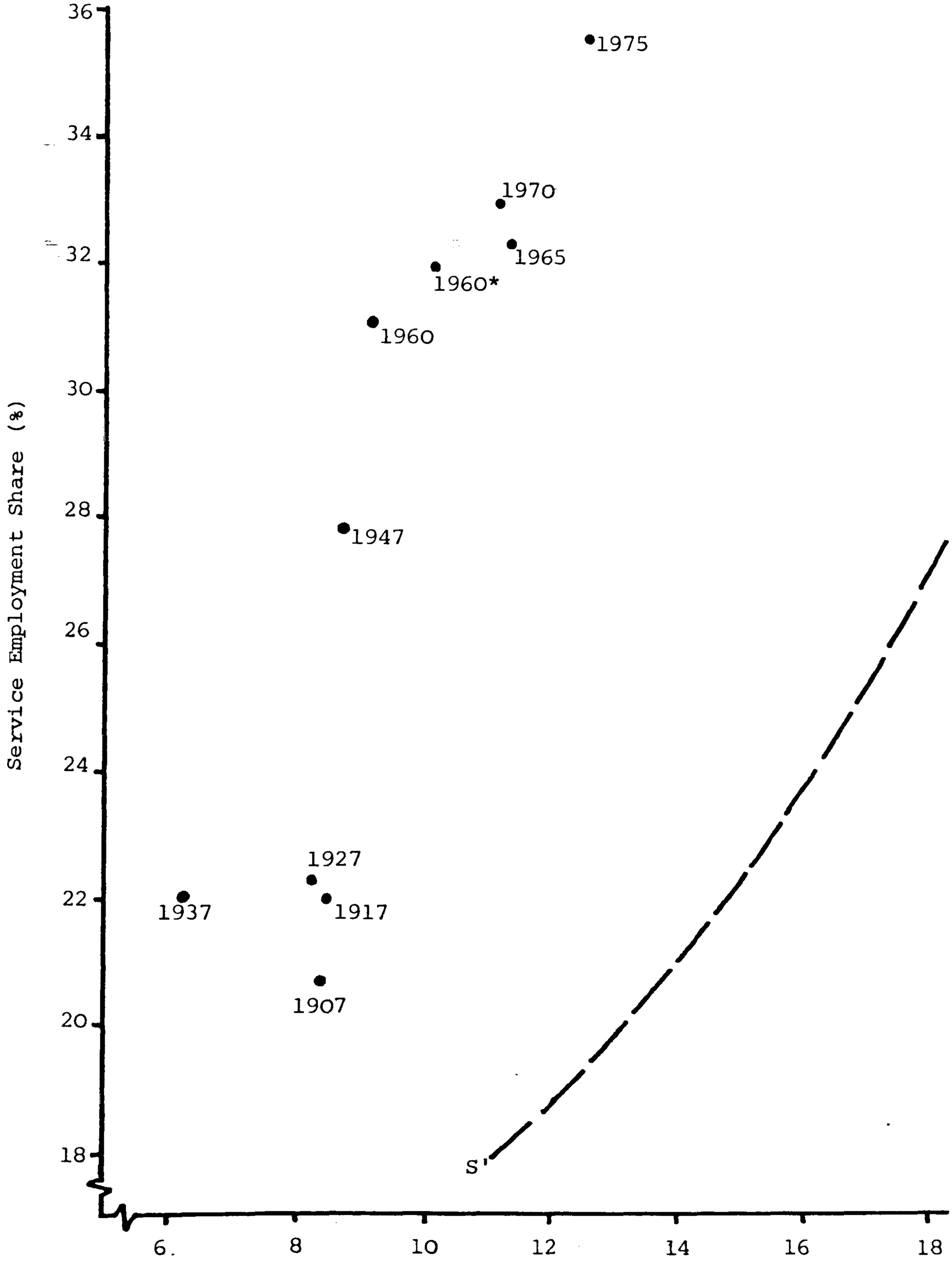


FIGURE 6.3 SERVICE AND INDUSTRIAL EMPLOYMENT SHARES: EGYPT 1907-75



Examining sectoral employment growth rates, an interesting historical pattern emerges, both within and between sectors. Annual employment growth rates are shown in Table 6.3. It can be seen that until the 1930s services tended to grow faster than industry as may be deduced from the previous share data. From the 1930s, till around 1965, the pattern is reversed however, with industrial growth exceeding service sector growth and a tendency for both sectors to grow faster than previously. After 1965, the pattern changes yet again with industrial growth lagging behind service growth till 1970. The position after 1970 is not clear. Industrial growth over the whole period 1970-75 appears higher than service sector growth (5.1% to 4.2%). However, almost 60% of industrial employment growth in this period, according to official statistics, occurred in the first year 1970-71. For the four remaining years, service growth again exceeded industrial growth with an average annual compound rate of growth for the period of 4.4% in services and 2.8% in industry. Therefore, it would seem that after 1960 industrial employment growth was only growing faster than service employment up to 1965. This was a continuation of a pattern evident since the 1930s, but after 1965 the pattern changes and services (in employment terms) began to grow faster than industry in absolute as well as relative terms.[8]

Table 6.3 also shows the growth of social service employment. Interestingly, for much of the 1927-1960 period, social services appear to grow faster than the industrial sector. After 1960 social services grow at a fairly constant rate (compared to the pre-1960 period) while industrial growth rates fluctuate. Again however after the relatively rapid industrial employment growth 1960-5, (and apart from the 1970-1 year discussed above), social service

TABLE 6.3 EMPLOYMENT GROWTH RATES: EGYPT 1907-75

Sector	1907-17	1917-27	1927-37	1937-47	1947-60	1960-5	1965-70	1970-75
Agriculture	2.3	1.9	1.3	0.1	0.8	2.9	1.5	0.8
Industry	2.5	2.1	-1.7	4.7	2.7	6.5	2.1	5.1*
Services	2.9	2.1	0.8	3.8	2.4	4.4	2.8	4.2
: Social Services	0.5	0.8	3.1	4.2	3.3	4.1	4.0	4.7

* Almost 60% of this growth occurred in the first year, 1970-1.

Note: Figures shown are average annual rates of change.

growth exceeds industrial growth.[9]

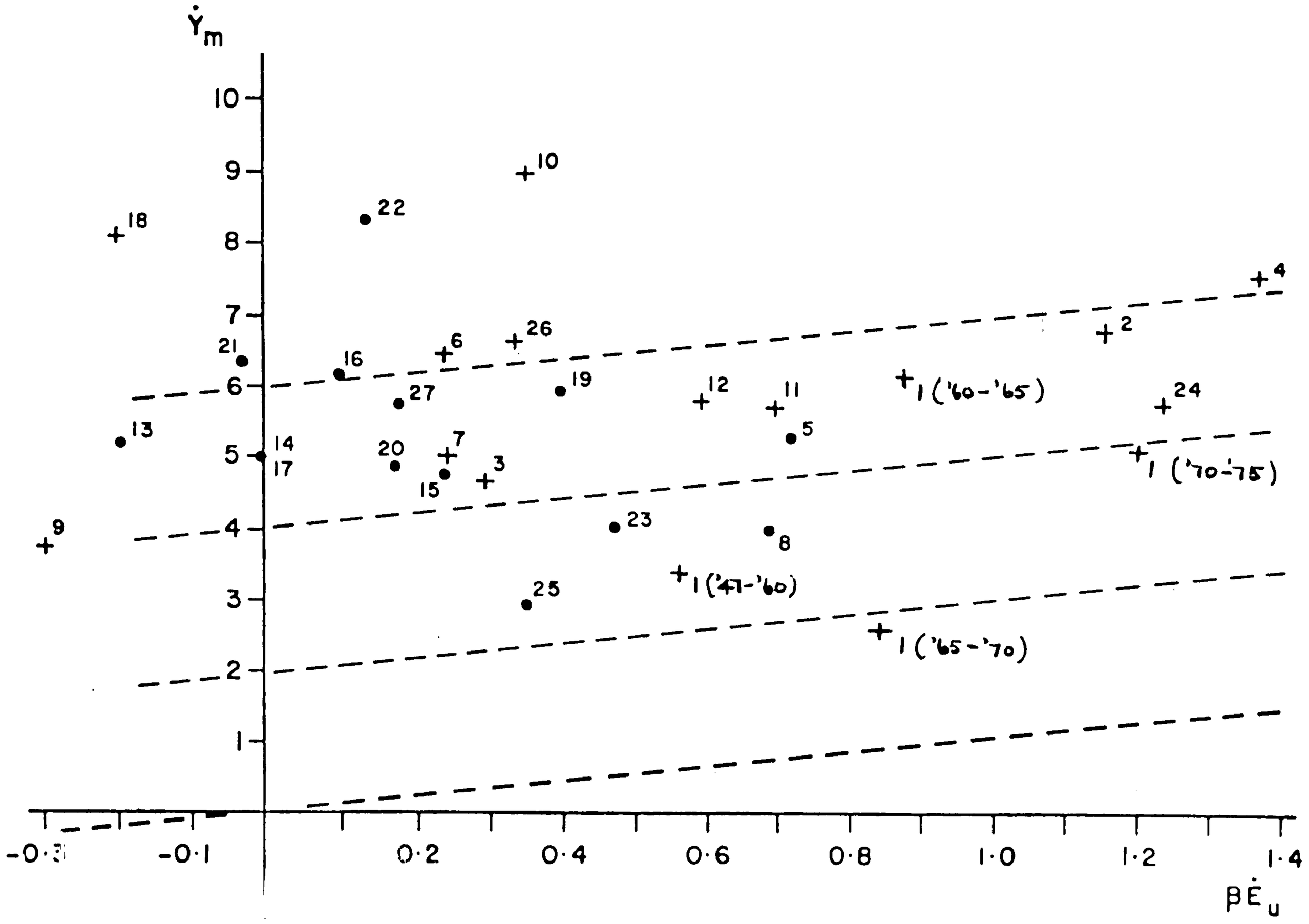
Finally, using the analysis developed in chapter 3 it is possible to put the growth in market and non-market sector employment relative to marketed output identified in Egypt in chapter 3 into historical context. It was shown in chapter 3 that during 1960-70 Egypt's macroeconomic performance in terms of the (weighted) growth rate of non-market employment relative to marketed output, was among the worst in the sample. In addition it was shown that a low rate of market sector productivity growth $(\dot{Y}_m - \dot{E}_m)$ was associated in Egypt with a low differential between marketed output growth and non-marketed employment growth $(\dot{Y}_m - \dot{E}_u)$. Figures 6.4 and 6.5 show these two aspects of Egypt's macroeconomic performance for the period 1947-75. Unfortunately the poor quality of data, and the distorting effect of the Second World War make meaningful comparisons with years before 1947 impossible.

It can be seen in Figure 6.4 that Egypt is on a lower isodifferential line during 1947-60 than that previously identified for 1960-70. However the 1960-70 period displays two very different halves. During 1960-5 Egypt becomes a fairly typical performer but for 1965-70, the substantial reduction in $\dot{Y}_m$ puts the economy on a very low isodifferential line. Between 1970 and 1975 although (weighted) non-market employment growth is higher, simultaneously higher marketed output growth puts the economy in a slightly better position.

Similar changes between periods are evident in Figure 6.5. A position fairly close to the origin in 1947-60, by international standards is followed by a higher value of $(\dot{Y}_m - \dot{E}_u)$ for 1960-5. However the economy's poor performance during 1965-70 is again evident with Egypt displaying slow market sector productivity growth and a

FIGURE 6.4

GROWTH IN MARKETED OUTPUT AND NON-MARKET EMPLOYMENT IN 27 COUNTRIES (1960-70)



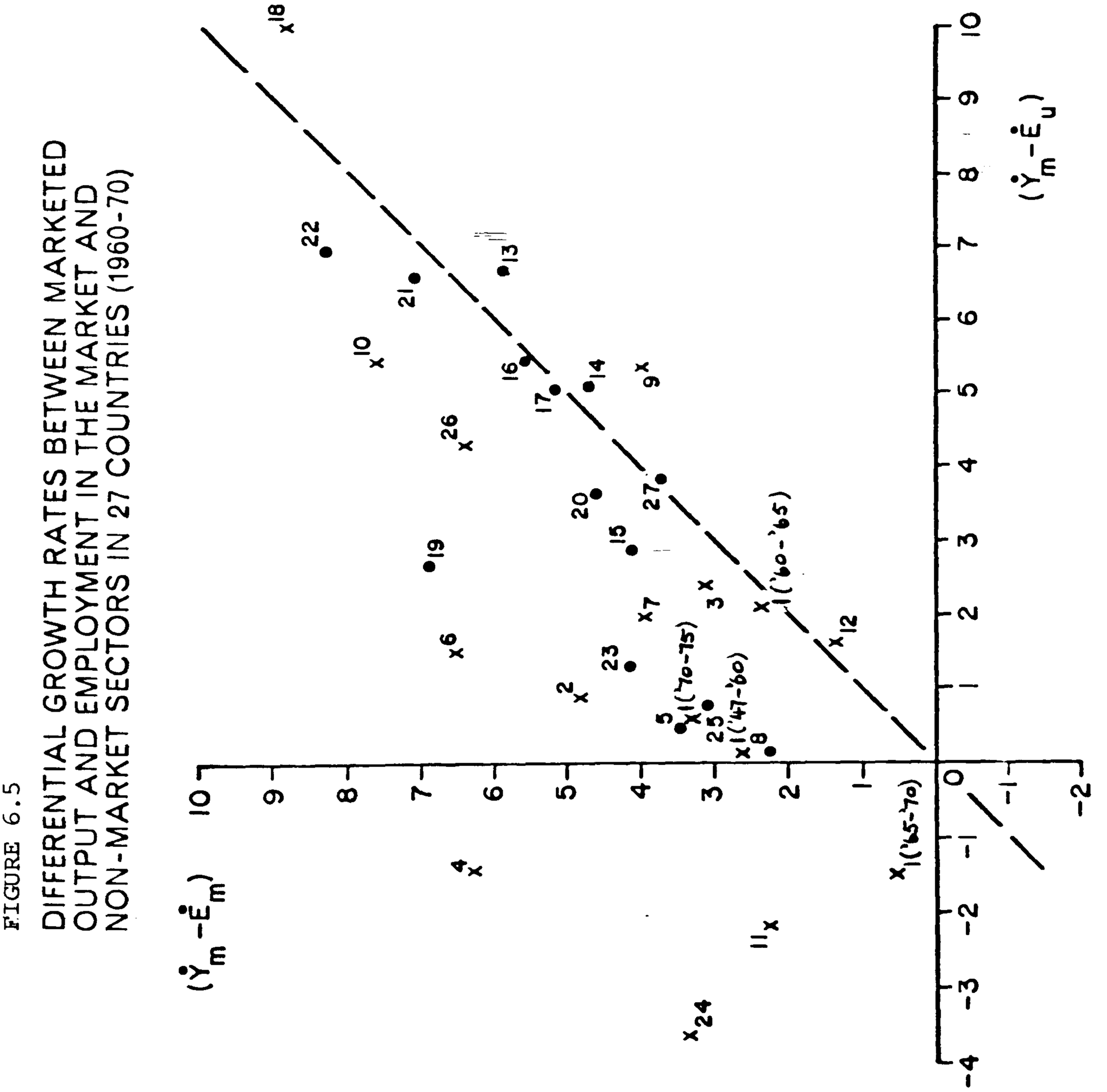

DIFFERENTIAL GROWTH RATES BETWEEN MARKETED OUTPUT AND EMPLOYMENT IN THE MARKET AND NON-MARKET SECTORS IN 27 COUNTRIES (1960-70)
$(\dot{Y}_m - \dot{E}_m)$
$(\dot{Y}_m - \dot{E}_u)$
$x_{1('65-'70)}$
$x_{1('60-'65)}$
$x_{1('70-'75)}$
$x_{1('47-'60)}$
x_{12}
x_{24}
x_{11}
x_4
x_6
x_2
x_7
x_{10}
x_{26}
x_9
x_{18}
x_3
x_5
x_8
22
21
13
16
17
14
19
20
15
27
23
25

FIGURE 6.5

negative ($\dot{Y}_m - \dot{E}_u$) differential. Some improvement is again shown after 1970.

Thus it would seem that the poor macroeconomic performance, identified in Egypt for 1960-70 in chapter 3, existed prior to 1960. Considerable improvements made during the first five-year plan, 1960-5 (in employment terms at least) were not maintained thereafter.

6.3 EXPLANATIONS OF STRUCTURAL CHANGE

Having examined some of the evidence of a relative growth in service sector employment in Section 6.2, in this section possible influences on, or explanations of, structural change in general are considered. Their relevance in understanding Egypt's structural change may then be investigated. Before examining some more general explanations however, two factors specific to the Egyptian economy, which may be held to explain the data discussed in section 6.2, are considered.

Firstly, it may be suggested that the relative growth of services after 1965 was simply a return to a longer-term trend, when the drive towards 'industrialisation' during the First Five-Year Plan (1960-5) lost its momentum in subsequent years. While there is some evidence, as will be seen later, that factors causing a growth in services during previous decades did also play a part in the post-1965 growth, they certainly could not be said to explain the whole phenomenon. Both the absolute growth rates of service employment and those relative to industrial employment have fluctuated considerably since the turn of the century. Also, compared to the 1947-60 period, both service sectors grew in absolute terms much faster from 1960 than previously, as indeed did the industrial sector, at least for the first five years.

In addition growth in some marketed services relative to the industrial sector occured for the first time (during the post-war period) only after 1965. Therefore it is unlikely that the post-1965 growth in services could be entirely explained as a resurgence of an earlier trend once the temporary emphasis of development effort on 'industry' had subsided from the mid-'sixties onwards.

Secondly it is often argued that in Egypt when the public sector expands it has a higher propensity to absorb labour than the private sector, and the growth of public ownership in manufacturing industry is frequently stressed.[10] This might lead to the presumption that the relative growth of services after 1965, as industrial sector rates fell, simply reflects the fact that the public sector failed to absorb labour at the rate achieved during the early 'sixties as the pace of development slowed thereafter. Thus employment grew less in the predominantly public industrial sector but continued to grow at a similar pace in the predominantly private service sector.

A sectoral breakdown of output data reveals however that the public sector is no more important in the goods than service sectors. In 1974 (one of few years where a breakdown is available) the public sector formed about 68% of value added in the industrial sector and 65% in the total service sector. If, over the 1960-75 period as a whole, public-ownership has extended in industrial sectors more than in services, and it is correct to assume that the public sector is more prone to employ surplus labour, then the observed relative growth of services is <u>less</u> than it might otherwise have been. Unfortunately evidence on public ownership changes across sectors is not available. It is clear then that neither of these two explanations is adequate to explain the relative growth in

service employment, and an understanding of the relevant causal factors must be sought elsewhere.

The body of literature which has emerged on the expanding share of services in various industrialised western economies has produced several hypotheses. The original arguments of Fisher (1939) and Clark (1940) that income elasticities and productivity differences between sectors are important explanations of the relative growth of service industries as part of the development process continue to have strong support. Other factors which economic theory suggests may cause differential sectoral employment growth include sectoral differences in the elasticities of substitution between labour and capital, and differences in input requirements arising from differential rates of technological progress between sectors or changes in relative factor prices. The effects of different combinations of capital and labour inputs across sectors may of course be evidenced in productivity differences. In the absence of factor substitution, different rates of wages growth between sectors may cause changes in labour allocation. Differences in wages between sectors are of course fundamental to many models of structural change, such as Lewis (1954), which tried to explain agriculture to industry shifts.

6.3.1 Income Elasticity of Demand

The link between income elasticities and differential employment growth between sectors is well documented in the economic literature.[11] It need only be reiterated here that it has been observed that as incomes rise so does the demand for (or consumption of) goods and services. Empirical evidence also suggests that once a certain level of goods consumption has been reached, further increments in

income may be used increasingly for greater consumption of services so that there is a tendency for the elasticities of demand for services to rise relative to goods as incomes rise.

Normally therefore higher, or a significant increase in, income elasticities for services may be expected to occur only in countries where per capita income is already relatively high and where a high level of goods consumption has been attained, while in Egypt by 1975 per capita national income was only a little over £100 (or approximately $250 at the exchange rates then prevailing). Thus it might be expected that income elasticities will be of little importance in any explanation of faster service employment growth in Egypt. However two points can be made here. Firstly, in countries where per capita income is not high but where income distribution is very inequitable, it is possible for a minority with high incomes to exhibit high elasticities for services while a majority of those on low incomes are allowed to form only a small part of total market demand. Many writers have pointed to the heavily skewed distribution of income in Egypt, among them Abdel-Fadil (1975) Radwan (1977) and Wilson (1975), who suggest that land ownership and rural incomes remain very inequitably distributed despite the aims and efforts of the socialist regime.[12] Mabro (1974) has also identified the persistence of an unequal income distribution in urban areas although the tendency there seems to be towards a more equal distribution. Secondly, it is of course possible that the Egyptian consumer exhibits a pattern of income elasticities legitimately inconsistent with that which has been observed in some other LDCs, and it is possible that a 'premature' demand for modern services may arise as some LDCs such as Egypt attempt to emulate 'western' lifestyles. It may be therefore that the relative growth in service sector

employment in Egypt since the mid-'sixties has been due to a rise in the income elasticity of demand for those services, relative to goods.

6.3.2 Productivity

It has long been argued that productivity growth can be expected to be slower in some services relative to goods-producing sectors with the result that, for equal rates of output growth across sectors, services require faster employment growth. Productivity growth is then argued to be closely linked to technological improvements which may be either exogenous or endogenous. Where technical progress is thought to be exogenous it is suggested that it is more able to affect industrial processes than the production techniques associated with services. On the other hand it is argued that technology embodied in capital has more effect on goods production because it is easier to ally more capital with labour in goods than in service production. Services, it is argued, often depend on 'personal' qualities and therefore need to be more labour intensive. Several criticisms have been made of these arguments not least that the causality between labour intensity and productivity improvements is far from clear, that productivity measures in many services are inadequate, and that in many services considerable productivity gains can be made by increased use of capital.

Interestingly some of the arguments for slower service productivity growth may now be more persuasive in less developed than in developed countries. In many LDCs where governments have been involved in planning and/or ownership of production, the objective of 'industrialisation' has led many governments to

encourage industrial establishments to grow while ignoring or inhibiting service expansion. Since industrial commodities are often easier to export than services, goods production is encouraged to help balance of payments problems. There may be various consequences for sectoral productivity growth rates from these policies. Firstly, governments may channel investment funds particularly towards manufacturing and related industries enabling faster productivity growth in these sectors, while services are relatively starved of capital. Secondly governments may encourage larger scale industrial production by various policies while the small-scale service sector is allowed to remain. Thus greater application of capital is possible in industry, and resulting scale economies are obtained. Therefore in some LDCs, government policies rather than technical factors may enable greater capital-isation and productivity growth in industry.

On causality, it is usually argued that, for a given level of, or growth in, real output, employment growth will be determined by the growth of, exogenously determined, productivity. These three variables are not however independent of each other and there are likely to be causal relationships among them. Higher rates of output growth may, for example, induce higher rates of productivity growth through economies of scale.[13] In Egypt, rather than employment responding to changes in output and productivity as is usually assumed in a mainly private enterprise economy, productivity falls may result from excessive employment growth in the public sector in an attempt to relieve unemployment. This effect, which has certainly occurred at some times in Egypt (see chapter 8) is however probably not widespread across industrial and service sectors, where private ownership remains substantial.

Where it does occur, it is legitimate to ask why it should be that higher employment growth does not result instead in faster output growth. Numerous factors could be responsible including a lack of demand, or a failure to increase non-labour inputs simultaneously.

6.3.3. Relative Factor Prices

The role of prices in the determination of quantities is a fundamental principle in economics, particularly in the neoclassical tradition. In the labour market firms may be expected to demand less labour as it's price (wages) rise. Where factor substitution is relatively easy a rise in the price of labour relative to capital will induce a shift in the combination of factor inputs towards capital and away from labour. Where factor substitution is difficult a rise in the price of labour may still result in lower demand for labour, particularly if firms seek to minimise costs or it is difficult to raise sales revenue in line with input price rises.

These effects may be relevant to structural changes in employment. Different rates of growth in wages across sectors (due, for example to differences in bargaining strength, or skill requirements) may lead to different rates of employment growth, as sectors experiencing more rapid wage increases economise more on their use of labour. Notice that if lower wage rises lead to lower output price increases in these sectors, this may increase demand for those sectors' outputs depending on price elasticities of demand. In addition, sectoral output comparisons will differ between real and nominal output measures.

In Egypt the allocative role of factor prices is likely to be complicated by a number of factors. Since the 1950s wage rates have been fixed officially in some sectors but not in others, so

that wages may perform different allocative roles across sectors. In some sectors where wages are officially fixed it appears that earnings and even actual rates paid may differ substantially from these. In addition to fixing wage rates some public sector establishments have been given simultaneous employment targets by governments, especially in the early 'sixties so that in these instances wages are unlikely to be an important determinant of employment. These and other wage and price controls have existed in Egypt in recent years often covering only some sectors of the economy for limited time periods. It must therefore be determined empirically whether wage differences are an important determinant of structural change in Egypt. This and other factors expected to affect the structural shift towards service industries are examined in chapter 7.

Footnotes

1. These problems are discussed in more detail in chapter 7.
2. Economic activities which may be classified as 'services' but which are here classified as 'goods', are public utilities and construction. These marginal activities are always difficult to allocate between groups, but in Egypt, as in most countries, they form a small proportion of total employment and therefore do not have much effect on inter-sectoral comparisons.
3. The terms 'commercial services' and 'social services' are used for convenience and are not necessarily meant to indicate homogeneity within groups. However commercial services predominantly include services which are marketed as opposed to the social service sector which predominantly includes non-marketed services provided 'free' by government e.g. health services and defence. Using the term 'social services' here avoids the possible confusion of identifying some marketed services in a 'non-market sector'.
4. This is definitionally the case when $R^2 < 1.0$ in an O.L.S. regression.
5. Among the LDCs, only Brazil in 1970 (not shown) has an excessively large service sector share comparable with that in Egypt.
6. For more detail on Egypt's five-year plans see chapter 9, footnote 6.
7. This is not to suggest that the patterns obtained from inter-national evidence in 1960 and 1970 were the relevant patterns as early as 1907. They are used here merely to indicate how Egypt came to diverge from the pattern in 1960/70.
8. The one odd year where this appears not to be the case, 1970-71, if it is not simply a statistical phenomenon (arising perhaps

from changes in sector classification) then, unlike the early sixties, there are no obvious explanations for this sudden and brief acceleration in industrial employment growth.

9. Some recent evidence on the 1970-79 period by Hansen and Radwan (1982) suggests that some of the service sector employment expansion, identified in this chapter up to 1975 has continued, particularly in government services. However they also suggest that higher demand for labour in the later 1970s has probably reduced the growth of private, informal services. See Hansen and Radwan (1982, pp. 535-541).

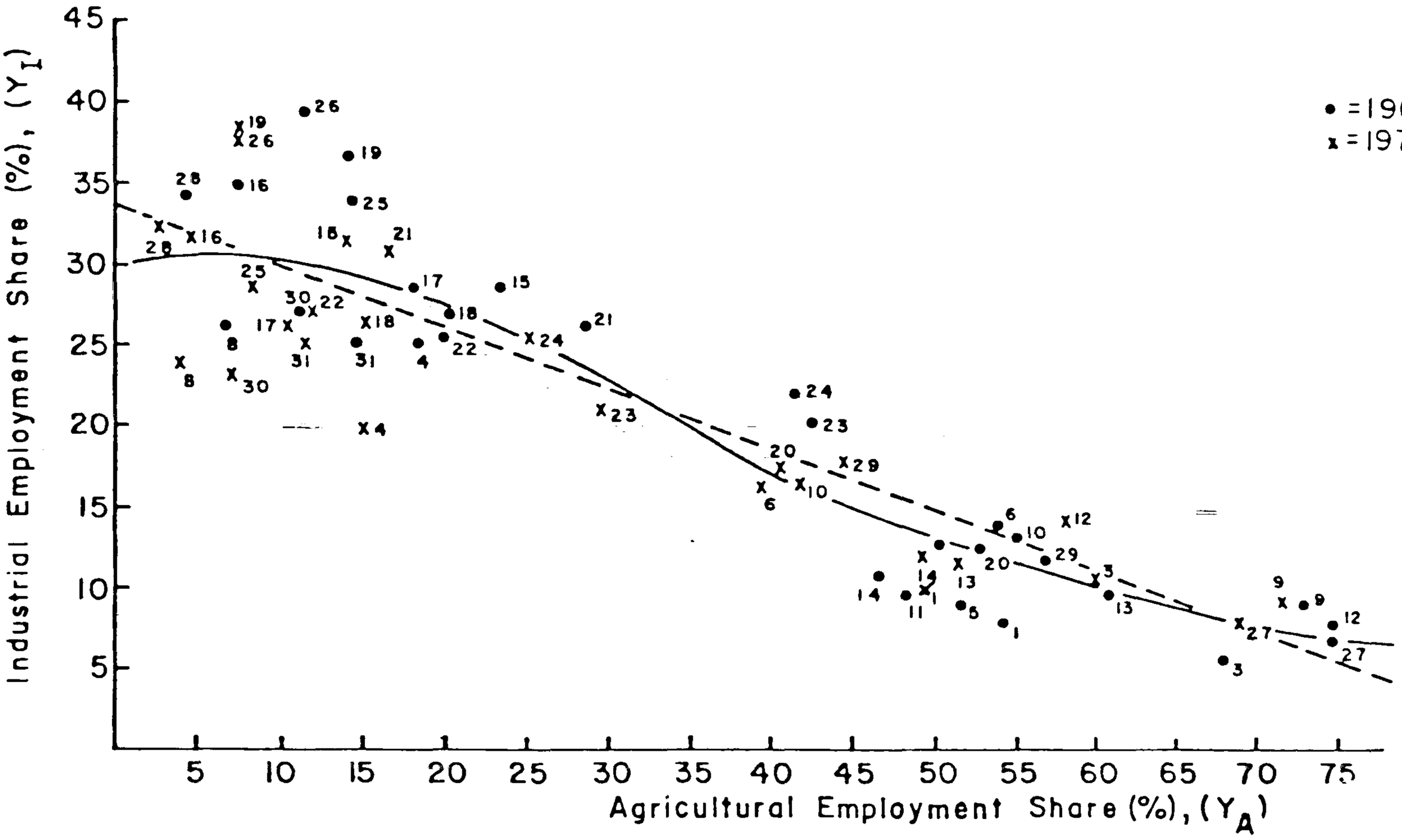
10. See, for example, Mabro and Radwan (1976, p. 96f). This is not to suggest that Mabro and Radwan do not recognise the growth of the non-manufacturing public sector; indeed they identify Finance and some areas of the Retail Trade as prime targets of State 'sequestration' in the early years of the new regime. However there is a tendency to stress the importance of the early 'sixties employment drive on manufacturing.

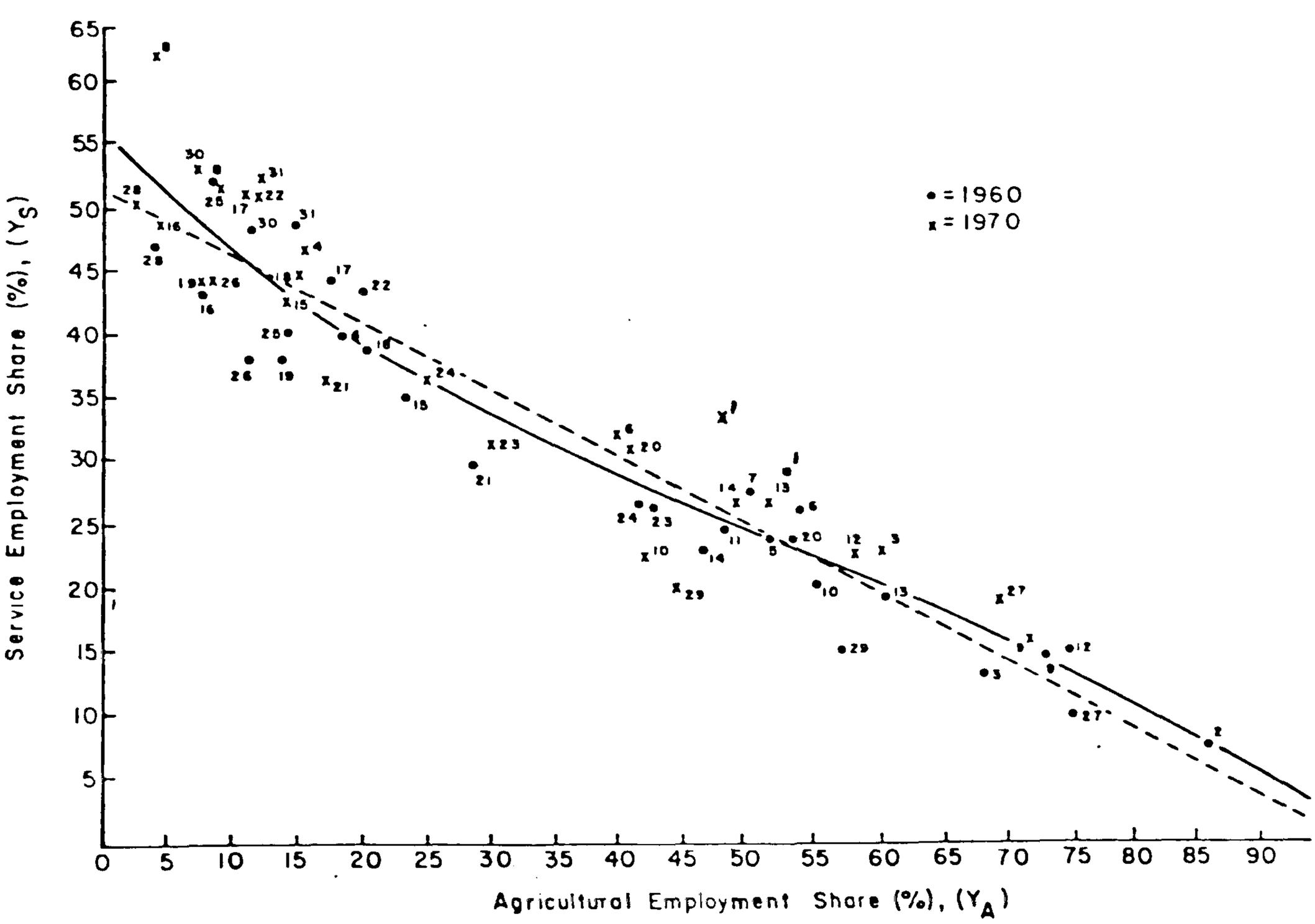
11. See Fisher (1939), Clark (1940), Chenery (1960), Maizels (1963) and Thirlwall (1972).

12. After studying income and land distribution in rural Egypt since the revolution Radwan (1977) concludes that 'the distributive effects of the Egyptian agrarian reform were marginal' (p. 75).

13. The effects of higher rates of output growth on rates of productivity growth have been well known as the 'Ver Doorn Law' following the work of Ver Doorn in 1949.

APPENDIX 6.1 EMPLOYMENT IN INDUSTRIAL, SERVICE AND AGRICULTURAL SECTORS, 1960 AND 1970





Note: Egypt is represented by number 1 on each diagram. Other countries are identified in Appendix 3.3.

C H A P T E R 7

EXPLAINING SERVICE SECTOR EMPLOYMENT GROWTH

7.1 INTRODUCTION

Evidence on service and industrial employment was presented in chapter 6. Factors causing differences in employment growth between sectors which economic theory or previous empirical investigation have suggested, were also considered. In this chapter the roles of various explanatory factors in Egypt's employment growth are examined. Rigorous testing of hypotheses on sectoral differences in employment requires a reliable a priori economic model, with well specified variables and relationships among them, and a reliable data set. In the case of structural changes in employment although economic theory has identified several causal factors, the interaction between variables is often unclear. Thus, for example, while differences in technical progress between sectors may be hypothesised, the effects of this on capital and labour inputs depend on many factors including the extent of embodiment of technical progress and its 'neutrality'. A priori decisions on these factors are rarely possible, so that predicting the nature of the relationships between technical progress and employment is extremely difficult. These problems are in addition to the problems of specifying and testing the relationships between employment and various independent variables within a sector. Studies of employment functions in developed countries using regression techniques for example have encountered serious econometric problems.[1]

The need for a reliable data set is of course self-evident. The confidence with which conclusions can be drawn from statistical results must ultimately depend on the confidence one has in the accuracy of the data set. In Egypt data on some variables which may be important in an explanation of employment growth are unavailable or unreliable. No official statistics are available for capital stock for example and price indices for capital are unreliable. Gross

investment data are published but particularly in some service sectors these are also unreliable.[2] Thus, the results from applying a regression methodology to employment data in Section 7.2 must be treated with caution. They can offer guidance on possible causal factors in Egypt but cannot be expected to provide precise estimates or definite conclusions.

In view of the limitations of applying econometric techniques to Egyptian data, in Section 7.3 and chapter 8 a less rigorous methodology is adopted which nevertheless can provide insights into influences on Egypt's recent structural changes. By comparing sectoral differences in employment growth with productivity and output growth differences it is possible to confirm some of the results in Section 7.2 and identify other important factors.

To examine structural changes the sector classifications used are as discussed in chapter 6, with a goods-producing sector being compared with a service-producing sector. There is no particular virtue in these classifications to make them superior to any others since, as Stigler noted in 1956, 'There exists no authoritative concensus on either the boundaries or the classification of the service industries'.[3] Insofar as theory has identified certain characteristics of 'goods' as opposed to 'services' this division of activities may be more useful. However the primary objective of this part of the study has been to include all sub-sectors in the examination so that the overall pattern of employment change can be investigated. Where appropriate individual sub-sectors are considered separately and in any case the non-agricultural goods sector (goods*) and the commercial and social service sectors are also examined in conjunction with the aggregate goods and service sectors.

Before looking at causes of structural employment changes therefore it is helpful to summarise the evidence on employment change in terms of the goods and service classifications to be used. Employment growth rates in goods and service sectors during 1947-60 and the three five-year periods 1960-75 are presented in Table 7.1. Relative employment growth can be seen from the ratios in Table 7.2.

Table 7.1 shows that employment in all sectors grew faster after 1960 than during 1947-60, with the goods* sector (line 2) growing particularly rapidly during 1960-5. Secondly, for commercial services the post-1960 growth rates are a new phenomenon, pre-1960 growth being just over 1% p.a. For social services, although employment growth after 1960 is higher than before, the increase in growth rates is less dramatic.

The increase in the relative growth of service sectors during 1960-75 is clearly demonstrated in Table 7.2. Using any of the sectoral definitions there is a systematic increase in the service to goods ratio from 1960-5, to 1970-5. However, apart from the ratio in line 3, the high ratios pertaining in 1947-60 are not achieved again till 1970-5, and even then the ratios are somewhat below the pre-1960 period. The commercial services/goods* ratio in line 3 appears to have risen considerably above that occuring prior to 1960, confirming that employment growth in commercial services has been particularly strong from 1960.

These data confirm that at least some service activities have grown rapidly since 1960 and have shown an increasing relative growth since the mid-1960s. This growth has been relative to both agricultural and non-agricultural goods sectors.

TABLE 7.1 SECTORAL EMPLOYMENT GROWTH RATES 1947-75

	Sector	1947-60	1960-5	1965-70	1970-5
(1)	Goods (G)	0.9	4.2	2.0	1.8
(2)	Goods* (G*)	2.2	8.1	3.9	4.4
(3)	Services (S)	2.4	3.8	3.3	4.3
(4)	Commercial Services (CS)	1.1	3.4	2.7	3.6
(5)	Social Services (SS)	3.3	4.1	3.9	4.7

TABLE 7.2 RATIOS OF SECTORAL EMPLOYMENT GROWTH RATES 1947-75

	Ratio	1947-60	1960-5	1965-70	1970-5
(1)	S/G	2.67	0.90	1.65	2.39
(2)	S/G*	1.09	0.47	0.87	0.98
(3)	CS/G*	0.45	0.42	0.69	0.82
(4)	SS/G*	1.50	0.51	1.00	1.07

7.2 APPLYING REGRESSION TECHNIQUES

To try to explain this relative shift of employment into services, in this section some of the determinants discussed in chapter 6 will be considered using annual data for the period 1960-76. It is first necessary to specify a structural employment model which identifies influences on employment in each sector. Structural changes in employment may occur because employment in each sector is affected by the same factors but in different ways or to differing extents, or because each sector is influenced by different factors. Thus for example income growth may affect employment in all sectors but to different extents because of differences in income elasticities while (as is shown in chapter 8) rural-urban migration may affect employment growth in one sector but not another. It is on the former type of factors that economic theory has had most to say while influences particular to specific sectors may often be identified from more ad hoc reasoning. In Section 7.2.1 below a simple model is presented which seeks to explain different levels of employment in different sectors from differences in reactions of employment to a common set of variables.

7.2.1 A Simple Model

If E_i is employment in sector i, Y_i is the demand for sector i's real output and W_i is the real wage rate in sector i, it is suggested that

$$E_i = f\ (Y_i, W_i) \qquad (7.1)$$

Thus employment is affected by the demand for the sector's output via the production function relationship (where output supplied is demand-determined), and by changes in the cost of the labour input. In addition Y_i, is assumed to be determined by per capita income levels,

i.e.

$$Y_i = g_i(Z) \tag{7.2}$$

where Z is per capita income. If, as has been argued, output demanded from different sectors varies with the level of income or development, (7.2) should capture this by differences in the g_i functions across sectors.

Therefore, from (7.1) and (7.2),

$$E_i = f\ (g_i(Z),\ W_i) \tag{7.3}$$

In fact various forms of the function in (7.3) have formed the basis of many 'employment function' studies particularly in developed countries. Such studies have usually sought to explain or forecast employment in an industry, or number of industries, using output and wage variables.[4] Differences in the effects of technology across sectors are not allowed for in this model because of the difficulties of modelling these effects with any assurance of accuracy.[5] In specifying the functional forms of (7.1) to (7.3) economic theory offers little guidance except that in (7.2) if different income elasticities across sectors are hypothesised then these elasticities may be expected to vary through time, and a double-log functional form (with the implied constant elasticity) seems less plausible. However since the period of investigation is fairly short constant elasticities over the period could be the most appropriate.

The model was tested using ordinary least squares regression on (7.2) and (7.3) using three functional forms of each; linear, semi-log and double-log. Thus in the linear form, for example, it is hypothesised that

$$E_i = \alpha + \beta Y_i + \gamma W_i \tag{7.4}$$

and

$$Y_i = \eta + \delta Z \tag{7.5}$$

giving a reduced form of,

$$E_i = (\alpha + \beta\eta) + \beta\delta Z + \gamma W_i \qquad (7.6)$$

Differences in the income elasticity of demand across sectors can be found by examining the values of δ for each sector and differences in the employment-output coefficient, β, can be derived from the coefficient on Z in (7.6). This applies likewise to the other functional forms tested. It might be expected that the dependent variables in (7.2) and (7.3) will be affected by contemporary and/or earlier values of the independent variables. Current and lagged values of Z and W_i were therefore tested.

7.2.2 Regression Results

Results were obtained for four sectors : goods*, services, commercial services and social services. Some results are presented in Tables 7.3 and 7.4 and a fuller set of results can be found in Appendix 7.1.[6]

Examination of the results in Appendix 7.1 suggests that for almost all the combinations of lagged and contemporaneous independent variables tested the linear and double-log functional forms perform similarly, though in most cases the linear form would be the preferred specification on the basis of correct coefficient signs and improved Durbin-Watson statistics. This is the case for regressions on equation (7.2) and (7.3). Secondly in almost all cases variables enter the equations with the correct sign. In regressions on (7.2) the coefficients on per capita GDP, Z, are always positive and significant. Regressions on (7.3) produce positive coefficients on per capita GDP and negative signs as predicted on average wages.

Thirdly, the results presented in Tables 7.3 and 7.4 show those equations which appeared to be most correctly specified and it can be

TABLE 7.3 SUMMARY OF REGRESSION RESULTS: EMPLOYMENT

Dependent Variable	Constant	Independent Variables Z_{-1}	W_i	$W_{i,-1}$	R^2	DW
Goods*						
EG*	-269.2 (-0.80)	35.72 (10.95)		-3.56 (-1.79)	0.90	1.32
† ln EG*	2.45 (1.96)	1.65 (10.46)		-0.40 (-1.75)	0.89	1.15
Services						
ES	160.9 (0.39)	58.02 (18.25)		-5.93 (-2.40)	0.97	1.95
† ln ES	4.53 (5.50)	1.37 (17.47)		-0.44 (-2.44)	0.96	1.91
Commercial Services						
ECS	96.76 (0.57)	18.99 (17.27)	-0.99 (-0.91)		0.96	1.56
† ln ECS	3.46 (4.85)	1.04 (17.71)	-0.15 (-1.11)		0.96	1.55
Social Services						
ESS	-329.1 (-1.14)	37.14 (15.05)		-2.01 (-1.42)	0.95	1.77
† ln ESS	2.70 (2.41)	1.53 (13.57)		-0.31 (-1.38)	0.94	1.69

† All variables are in log. form.

Notes: Z_{-1} and $W_{i,-1}$ are respectively per capita GDP, and average annual wages in each sector, lagged one period. DW = Durbin-Watson statistic. t-statistics are in parentheses. EG* = Employment in Goods*, ES = Employment in Services, etc.

TABLE 7.4 SUMMARY OF REGRESSION RESULTS: OUTPUT

Dependent Variable	Independent Variables: Constant	Z_{-1}	R^2	DW
Goods*				
YG*	-637.3 (-5.60)	21.70 (11.86)	0.91	1.14
† ln YG*	-1.33 (-2.06)	1.91 (12.19)	0.91	1.09
Services				
YS	-1215.8 (10.51)	33.89 (18.20)	0.96	1.52
† ln YS	-2.91 (-6.56)	2.34 (21.72)	0.97	1.81
Commercial Services				
YCS	-289.2 (--4.36)	10.36 (9.70)	0.87	1.13
† ln YCS	-1.20 (-1.65)	1.71 (9.65)	0.87	1.08
Social Services				
YSS	-926.6 (-10.42)	23.53 (16.45)	0.95	1.21
† ln YSS	-5.35 (-7.56)	2.81 (16.34)	0.95	1.15

† All variables are in log. form.

Notes: YG* = output from goods*, YS = output from services, etc. See also notes to Table 7.3.

seen that for equation (7.3) (Table 7.3), lagged values of both independent variables are preferred in all sectors except Commercial Services, (CS). However, as can be seen in Appendix 7.1 in the CS sector the choice between current or lagged wages is not clear-cut. Regressions on equation (7.2), (Table 7.4) suggest that lagged values of Z are preferred for all four sectors, though in some cases an indeterminate Durbin-Watson statistic leaves some doubt over the specification of even the 'best' equations.

Given the data base, these results are surprisingly good. There can be reasonable confidence in the variables specified in each equation, particularly the linear forms. In Table 7.3 serial correlation does not appear to be present in the equations with the possible exception of the goods* sector. The Z_{-1} variable is always significant and R^2s are high. The role of real wages in employment determination is however unclear. Although in most sectors the real wage variable is not significant at the 5% level, t-statistics are sufficiently high and coefficient signs consistently correct, as to suggest that reductions in real wages may encourage increased employment in each sector and vice versa.[7] However little confidence can be placed in the parameter estimates in each sector so that differences between sectors in the responsiveness of employment to wage changes cannot be reliably ascertained from these results.

Coefficient estimates for per capita income in Table 7.3 are more reliable than those for real wages. Coefficients on Z_{-1} are also highly significant in Table 7.4 though the somewhat poorer Durbin-Watson statistics may mean that an alternative specification of the equation is justified, which in turn could alter the income coefficients. Nevertheless it can be seen in Appendix 7.1 that the values of the income coefficients for each sector in Table 7.3 change

very little when different combinations of the independent variables are used, suggesting that these estimates are reasonably robust.

The hypothesis of differences in income elasticities across sectors can now be considered. Table 7.5 shows estimates of elasticities from the double-log form (as reported in Table 7.3) and elasticity estimates from the linear form for three years during the period studied, 1961, 1970 and 1975. At first glance it appears that service outputs possess a higher income elasticity than goods outputs, whether constant or variable elasticities are assumed. However in the variable elasticity case it can be seen that the service elasticity is declining more rapidly than that of goods*, giving a relative increase in goods* sector elasticity. When the two service sub-sectors, commercial and social services, are considered separately the case for higher service sector elasticities is shown to be limited to social services. Commercial service elasticities are lower than goods* although they are increasing slightly relative to goods* elasticities in the variable elasticity case. Because of the measurement problems associated with social service outputs the apparent higher elasticity here must also be treated with caution. Since this sector's output is measured from wage payments, the higher 'elasticity' measure actually indicates that the change in the social service wage bill exceeds the change in goods* output for a given increase in per capita incomes. To the extent that a rise in these social service 'costs' represent increased 'value' of social service output as a response to increased demand, social services may be considered to possess higher elasticities. Evidence on the growth of Egypt's social services (see chapters 8 and 9) would suggest that, in general, this is not the case.

TABLE 7.5 ESTIMATES OF INCOME ELASTICITIES AND EMPLOYMENT-OUTPUT COEFFICIENTS

Sector	Constant Elasticities (log-log regression)	Declining Elasticities			Employment-Output Coefficients	
		1961	1970	1975	log-log regression	linear regression
Goods*	1.91	2.34	1.87	1.58	0.864	1.646
Services	2.34	3.33	2.31	1.81	0.585	1.712
Commercial Services	1.71	2.19	1.79	1.53	0.608	1.833
Social Services	2.81	4.30	2.65	1.96	0.544	1.578

Despite the apparently higher elasticities for service outputs (and social service outputs), the regressions in Table 7.3 indicate that the overall effect of increases in per capita income on sectoral employment is, in some cases, less in service sectors than in goods*. The income coefficient on lnECS for example is 1.04 as against 1.65 for goods* (lnEG*). This must arise because of lower values for the employment-output coefficient (β in equation (7.4)) in services. Estimates of these coefficients, which represent the technical relationship between output and employment derived from the production function in each sector, are also presented in Table 7.5. The estimates from the log. regressions indicate that for a given increase in output within a sector more additional employment will be generated in the goods* sector than in either of the service sub-sectors, (and therefore in total services also). However β values estimated from linear regressions suggest a higher value for commercial services than goods*. Therefore the employment-output coefficient in social services would appear to be unambiguously lower than goods* while that for commercial services (if linear results are adopted) is probably higher.

If, as has often been argued, service activities are more labour-intensive than goods production, a higher value of β is to be expected in services, increases in output requiring more additional labour input than in goods sectors. The lower coefficient estimates for social services (and possibly commercial services) are therefore unexpected. The most plausible explanation probably lies in the output measure. If output increases estimated for the goods* sector represent genuine improvements in real output, significant employment increases may be expected. If, in social services, on the other hand, output increases represent mainly

average wage rises, 'output' will rise with little employment change. It would seem therefore that although employment in each of the sectors considered can be explained fairly well within the model used, there does not appear to be a consistent pattern of higher income elasticities or higher employment-output coefficients in service sectors than in goods* sectors.

Finally, since the evidence in Section 7.1 suggested that not only is service employment increasing relative to goods employment but the relative rate of growth of service employment is increasing, it is interesting to examine the effects of changes in income and wages on the change in employment in each sector. It may be, for example, that while employment does not react to changes in wage rates, the rate of change of wages does affect the rate of employment growth. Regression results for these difference equations, in linear and double-log form, are given in Appendix 7.2.[8] They suggest that, in general, changes in employment are not strongly influenced by changes in per capita incomes or wages, in any of the four sectors. Wage rate changes have most effect in social services but in commercial services and goods* sectors wage coefficients are insignificant and sometimes wrongly signed. Income changes similarly perform poorly and R^2s are generally low. It seems clear that, at least for the 1960-76 period as a whole, faster employment growth in services cannot be explained with reference to growth rates of income or average wages.

7.3 DIFFERENCES IN OUTPUT AND PRODUCTIVITY

The evidence considered in Section 7.1 suggested that there were differences within the 1960-75 period in the growth rates of goods and service sectors. This may reflect differences within the

period in the factors influencing structural change. Unfortunately, because of the limited number of observations it is not possible to examine sub-periods using the regression methodology. Also, differences between sectors in the rates of growth of productivity were not examined in Section 7.2.[9] In this section therefore a less rigourous, but nevertheless useful, methodology is used to help identify influences on service and goods employment growth and possible differences between the sub-periods previously discussed.

By comparing differences in sectoral employment growth rates with sectoral differences in output and productivity growth rates it is possible to determine whether employment growth differentials are primarily associated with output growth differentials or productivity growth differentials. Using this method to examine relative service employment growth in the United States, Fuchs (1965) argued that if differences in employment growth could be shown to be primarily associated with output, rather than productivity differences, then demand (proxied by output) could be argued to be the main factor causing differential employment growth.[10] Various reasons were given in chapter 6 why causality may not operate in this way in Egypt, and it is also likely that in some cases changes in output in Egypt reflect supply factors more than demand. State control of the means of production in a large proportion of the economy and the effects of legislative control can create significant supply constraints on output. These may be variable across sectors. For example, since many more intermediate goods than services are imported into Egypt, foreign exchange limitations may impose greater limits on domestic goods output than service output, even though demand for those goods is higher. With these caveats in mind, the association of employment, output and productivity differentials across sectors

may be examined. As will be shown, they do enable some tentative conclusions to be drawn, in this and the next chapter, on the influences on Egypt's relative service employment growth.

7.3.1 Output Differences

To estimate differences in real output between sectors two measures of real output are used - Gross Domestic product at constant 1960 prices (measure I), and at current prices (measure II). It is likely that implicit price deflators for services (and particularly social services) are underestimates relative to goods so that the constant price data probably overestimates the output differential in favour of services.[11] Conversely, current price data which assume both sectors' prices increase at the same rate probably underestimate the real growth in service output relative to goods. It is however likely that measure II (current prices) is the more accurate for this comparison.[12]

Table 7.6 shows sector differentials in the rates of growth in employment and real output, using both measures, for the three five-year periods. Between 1960 and 1965 goods sectors, however defined, grew faster in employment terms that services. Variations in the employment differentials result mainly from slow growth in agriculture and a faster growth in social services. In line (1) of Table 7.6, considering the aggregate service sector relative to goods it may be seen that during 1960-5 a negative differential employment growth is associated with a small positive output differential (assuming that the true growth in real output lies somewhere between the two measures). During 1965-70 however when employment in services begins to grow faster than the goods sector, this positive differential becomes associated with a slower output growth in services than goods.

TABLE 7.6 SECTOR DIFFERENTIALS IN RATES OF GROWTH IN EMPLOYMENT (E) AND OUTPUT (Y), 1960-75

	1960-5			1965-70			1970-5		
	$(E_s - E_g)$	$(Y_s - Y_g)_I$	$(Y_s - Y_g)_{II}$	$(E_s - E_g)$	$(Y_s - Y_g)_I$	$(Y_s - Y_g)_{II}$	$(E_s - E_g)$	$(Y_s - Y_g)_I$	$(Y_s - Y_g)$
ervices - Goods	-0.4	1.4	0.6	1.3	0.1	-1.5	2.4	6.5	2.8
ervices - Goods*	-4.3	-1.0	-0.4	-0.6	-1.0	-1.6	-0.1	5.0	3.3
) Commercial Services - Goods*	-4.7	-1.5	-0.5	-1.2	-5.5	-5.2	-0.8	6.4	4.4
) Social Services - Goods*	-4.0	-0.7	-0.3	0.0	1.7	1.0	0.3	4.1	2.6

A similar phenomenon occurs in lines (2), (3) and (4); employment in the goods* sector grows faster than either definition of the service sector during 1960-5 and faster than commercial services in 1965-70. The output differential moves quite differently for the two service sub-sectors. The relative employment growth of commercial services (line 3) is associated with a sizable decrease in its output differential for 1965-70. This trend is reversed during 1970-5 when there is a large increase in the output differential in favour of services. Had this situation occurred over a longer time period it could be argued that income elasticities for commercial services had risen relative to goods. However since this trend occurs only over a five year period and is a reversal of earlier trends in sectoral employment/output growth, it is unlikely that income elasticities could be regarded as an important explanation of the relative growth of commercial services employment from 1965 to 1975.

For social services, the data do suggest that the rising employment differential is consistently associated with a rising output differential (line 4). However it may be noted that the large rise in the employment differential, from the first to second periods, of 4 percentage points (-4.0 to 0.0) is associated with only a 1.3 percentage point rise in the output differential. The reverse is true for 1970-5 when a large increase in the output differential occurs with only a small increase in the employment differential. Demand for social services would appear therefore to be only a partial explanation, at best, of that sector's employment growth. However, since the majority of these services are in public ownership and are financed from public funds, any observed output growth in these services (which are of course measured by inputs) is effectively decided by public agencies on behalf of these private citizens who

consume them. To the extent that these services are financed by taxation, private consumers may be considered to be allowing their 'social wage' to be used in the purchase of these social services and therefore have indirect income elasticities for them. However with the Egyptian budget deficit high and increasing over the period, arguably the government is exhibiting income elasticities of demand in excess of the elasticities of the consumers it represents.[13]

Therefore it appears that the rise in service employment growth relative to goods cannot be satisfactorily explained by a relative rise in the demand for services. The rise in social service employment, while possibly associated with a faster rise in social service output, seems to result from government expansion which is difficult to interpret in demand terms. In addition the goods sector probably suffered disproportionately from persistent supply bottlenecks, failure to implement plan targets and import restrictions, causing goods sector output to grow less than demand.[14]

7.3.2 Productivity Differences

To the extent that employment growth is not associated with output growth it will of course be associated with productivity growth as measured by output per man, since the rate of growth of output is (in discrete time) approximately equal to the sum of the rates of growth of employment and output per man. Output per man is however a rather crude measure of productivity. Differences in hours worked or skill types and levels may contribute to differences in output or labour requirements. In examining differences in productivity between sectors it may be important to correct for differences in such factors as hours worked, human capital differences and so on. Unfortunately there is insufficient appropriate data for Egypt to

allow such corrections to be made. However some evidence on hours worked and labour quality differences is examined in Appendix 7.3. Though partial, this evidence does not suggest any major inaccuracies will arise from the use of output per man to measure inter-sectoral productivity differences.

Table 7.7 shows output per man differentials using both measures of output. It is clear that the increase in the employment growth differential between 1960-5 and 1965-70 is associated with a sizeable fall in the relative growth in output per man in services. Whereas during 1960-5 productivity growth in services exceeded that in goods, during 1965-70 the reverse is generally true. Considering the total service and goods sectors for example; before 1965 a faster employment growth in goods of 0.4% per annum is associated with a productivity growth of between 1% and 1.7% slower than in services. After 1965 service employment growth exceeds goods by about 1.3% per annum, but now service productivity growth is slower than goods by between 1.2% and 2.8%. In other words, it could be argued from the data that the faster employment growth in services after 1965 was precipitated because of a slow productivity growth after this date. However such a universal conclusion would be misleading for two reasons. Firstly data after 1970 suggests a reversal of this trend, with ample evidence in Table 7.7 that between 1970 and 1975 the increased relative employment growth in services is no longer associated with relatively slower productivity growth. Secondly, the large productivity growth differentials arise mainly because of a particular decline in productivity in commercial services, the reasons for which will be discussed later. It is clear from line(4) that social services have not in general experienced such dramatic changes over the 1965-75 period. The increased employment differential in

TABLE 7.7 SECTOR DIFFERENTIALS IN RATES OF GROWTH IN EMPLOYMENT (E) AND OUTPUT PER MAN (P), 1960-75

	1960-5			1965-70			1970-5		
	$(E_s - E_g)$	$(P_s - P_g)_I$	$(P_s - P_g)_{II}$	$(E_s - E_g)$	$(P_s - P_g)_I$	$(P_s - P_g)_{II}$	$(E_s - E_g)$	$(P_s - P_g)_I$	$(P_s - P_g)_{II}$
2) Services - Goods	-0.4	1.7	1.0	1.3	-1.2	-2.8	2.4	3.8	0.3
Services - Goods*	-4.3	3.1	3.8	-0.6	-0.5	-1.1	-0.1	4.9	3.3
3) Commercial Services - Goods*	-4.7	3.1	4.2	-1.2	-3.4	-3.8	-0.8	7.0	5.1
4) Social Services - Goods*	-4.0	3.1	3.6	0.0	1.7	0.9	0.3	3.6	2.2

1965-70 is associated with a large fall in relative productivity growth, while the improvement in relative productivity growth after 1970 is associated with only a small rise in the employment differential.

The large decrease in the commercial services productivity during 1965-70 appears to be a specific and abnormal phenomenon. Examining more disaggregated data (see chapter 8) reveals that the 'Transport and Communications' sector, although it did not form a substantial part of commercial service employment, was a substantial contributor to commercial service output, mainly from Suez canal revenues. The cessation of these revenues following the 1967 Arab-Israeli war meant a large fall in commercial service output without a similar employment decrease.

If then the 1960-5 period is excluded for the moment because of the abnormal trends it shows, overall trends in output and productivity from the early 'sixties to the early 'seventies can be assessed. Comparing Tables 7.6 and 7.7 reveals immediately that different conclusions concerning the relative importance of output and productivity in influencing employment growth will be reached depending on which output measure is used. For example, comparing the social service and goods* sectors in line 4 of Tables 7.6 and 7.7: current price data (measure II) indicates that the increase in the employment differential from -4.0% in 1960-5 to 0.3% in 1970-5 is associated with a rise in the output differential from -0.3% to 2.6% and a fall in the output per man differential from 3.6% to 2.2%, i.e. changes in output and productivity both have strong influences on employment with output effects slightly larger. The constant price data, (measure I) however suggests that the increase in the employment differential occurs almost entirely because the output differential

has risen, with productivity differentials remaining fairly constant. As previously noted it is likely that the current price measure (II), though clearly less accurate when calculating absolute real growth rates, is the more accurate measure of the relative growth rates between sectors in Egypt over this period.

If this is the case then the data in the two tables suggest that the increasing employment differential in favour of services from 1960-5 to 1970-5 is associated primarily with a rising output differential. However this association is not uniform across service sub-sectors. The relative social service growth in line (4) occurs with a 1.4 percentage point decrease in the productivity differential (or a 0.5 percentage point increase if measure I is adopted), whereas in commercial services (line 3) a 0.9 percentage point increase is recorded (or 3.9 percentage points in measure I). These differences suggest that the respective roles of output and productivity in an explanation of relative service employment growth are variable and therefore an explanation (or explanations) of service sector expansion must be pursued at a more disaggregated level. This is the concern of chapter 8. Nevertheless it is interesting to note that, in general, output has had a more consistent influence on employment than productivity, though particularly in social services it would not seem justified to conclude that demand for these services have been substantially higher in later years.

7.4 SUMMARY AND CONCLUSIONS

Following more extensive evidence in chapter 6, it was shown in Section 7.1 that over the 1960-75 period there was a strong trend towards increasing employment in service activities, both commercial and social as opposed to goods-producing activities. In some services

this appeared to be a return to trends evident prior to 1960 but which had been halted in the early 'sixties, while in others the strong absolute and relative employment growth was a new phenomenon.

Using a simple model in Section 7.2 in which changes in per capita income and average wages were hypothesised to affect employment, data for 1960-76 were tested using regression analysis. Although wages did not seem to be important in employment determination, per capita income effects were generally strong. However the hypothesis that sectoral employment differences were affected by differences in income elasticities across sectors did not find much support.

In Section 7.3 the respective influences of output and productivity on employment growth were considered for three five-year periods, and it was argued that neither one of these factors was dominant overall, with relative employment growth appearing to be associated with changes in relative output and productivity growth in different periods. In addition there seemed to be differences across sector results. The relative growth of commercial service employment occurred with a very large increase in the relative growth of output, and a positive productivity growth differential which kept employment growth lower than it might otherwise have been. In social services on the other hand, relative employment growth was probably larger than relative output growth because of a simultaneous decrease in relative productivity growth. This conclusion is however slightly sensitive to the output measure used.

The variability, both in time and across sectors, in the role of output growth was sufficiently large as to confirm that higher income elasticities for services relative to goods could not

be supported overall. Demand for some services however did appear to be strong. The reasons for this, and the very different rates of productivity growth across service sectors are considered in chapter 8.

Finally, it was noted that trends evident during 1965-70 were strongly influenced by selective effects of the 1967 war which had a large effect on commercial service sector output in particular, mainly as a result of the closure of the Suez canal. Because of the low labour intensity of services associated with the Suez canal, there was little effect on employment in this sector.

Footnotes

1. An excellent survey of these problems can be found in Hazeldine (1981). A typical example of the econometric problems can be found in the debate on the effects on employment of output and productivity. See Kaldor (1966), Rowthorn (1975), McCombie (1981, 1982).

2. Some problems of capital measurement in Egypt are discussed in Radwan (1974) and Mabro and Radwan (1976, pp. 151-166).

3. Stigler (1956, p. 47). Fuchs (1968, pp. 14-17) discusses classification problems in more detail.

4. See Hazeldine (1981), Creedy and Thomas (1982, pp. 14-39). Recent studies in the U.K. and U.S.A. have usually included a time trend (to capture technology effects) and lagged values of the employment variable to allow for partial adjustment of employment within a period (using quarterly data).

5. The commonly-used time trend to model technology effects is highly unsatisfactory, not least because of the implied assumption that technology improvements occur in a smooth and uniform manner. Many empirical studies find time trends highly significant in their results and it is likely that it is a proxy for many factors other than technology.

6. Results from semi-log regressions were in general slightly poorer than those of linear or log-log regressions and are not presented. The aggregate goods sector functions were also tested but did not perform well. This may be expected because trends in agricultural employment are obviously very different from trends in non-agricultural goods employment. Factors affecting agricultural employment are also likely to be different.

7. The significant wage variables for service sector equations cannot be relied upon since this occurs in neither of the two service sub-sectors.

8. A difference equation in logs, whereby $\Delta \ln E_i = f(\Delta \ln Z, \Delta \ln W_i)$ is, of course, equivalent to examining the relationship between the proportionate growth rates of Z and W_i and the rate of employment growth.

9. The inclusion of productivity (as measured by output per man) and output variables in an employment function raises particular econometric difficulties because of the identity linking the three variables. See footnote 1.

10. Fuchs was aware of the inter-relationship among these three variables but considered that, for his data, employment could be explained by productivity and demand. See Fuchs (1965, pp. 8-10, 12).

11. It is widely recognised that deflators used to produce constant price GDP figures, since the 1960s at least, are underestimated so that in 'Industry' for example, though average money wages were about 100% higher in 1975 than in 1960, prices in that sector were apparently only 40% higher. This difference is large enough to suggest that price controls are unlikely to be an adequate explanation and in the service sectors the difference is even larger.

12. Although the prices of many services probably did increase by less than those of many goods in this period the difference implicit in real GDP data clearly exaggerates this and the assumption of equal price rises across sectors is probably closer to the truth. For a discussion of price deflator problems in Egypt, see Kanovsky (1970, p. 219).

13. Of course it is often the case where public goods and services are concerned, that if the decision was left to the individual he would display income elasticities below those which are in his own best interest or in the interest of the nation as a whole. The oft-quoted example of defence is particularly relevant in Egypt where the

continuing threat of war makes it imperative that adequate defence measures are taken, measures which if left to the individual are unlikely to be sufficient.

4. For discussion of some of these effects in the industrial sector, see Mabro and Radwan (1976, pp. 49-75, 194-197).

APPENDIX 7.1 REGRESSION RESULTS OF EMPLOYMENT MODEL: EMPLOYMENT LEVELS

GOODS* SECTOR (G*)

Dependent Variable	Constant	Independent Variables (ln)Z	(ln)Z_{-1}	(ln)W_i	(ln)$W_{i,-1}$	R^2	D.W.
EG*	-501.1	33.30		-1.50		0.92	0.86
	(-1.62)	(13.07)		(-0.82)			
lnEG*	1.25	1.63		-0.16		0.91	0.82
	(1.00)	(11.90)		(-0.70)			
EG*	-740.3		34.13	-0.08		0.88	1.05
	(-1.88)		(9.68)	(-0.04)			
lnEG*	0.42		1.61	0.03		0.87	0.94
	(0.29)		(9.29)	(0.13)			
EG*	-467.2	31.13	1.31	-1.31		0.92	0.85
	(-1.29)	(2.28)	(0.09)	(-0.66)			
lnEG*	1.28	1.36	0.21	-0.11		0.90	0.81
	(0.91)	(1.84)	(0.27)	(-0.45)			
EG*	-269.2		35.72	-3.56		0.90	1.32
	(-0.80)		(10.95)	(-1.79)			
lnEG*	2.45		1.65	-0.40		0.89	1.15
	(1.96)		(10.46)	(-1.75)			
EG*	-167.3	29.34	4.04	-3.68		0.94	1.22
	(-0.59)	(2.61)	(0.32)	(-2.22)			
lnEG*	2.74	1.35	0.26	-0.43		0.93	1.07
	(2.49)	(2.23)	(0.41)	(-2.15)			
YG*	-599.8	20.39				0.96	0.92
	(-9.40)	(20.31)					
lnYG*	-1.41	1.91				0.96	0.74
	(-3.21)	(18.01)					
YG*	-637.3		21.70			0.91	1.14
	(-5.60)		(11.86)				
lnYG*	-1.33		1.91			0.91	1.09
	(-2.06)		(12.19)				

contd.

Dependent Variable	Independent Variables: Constant	(ln)Z	(ln)Z_{-1}	(ln)W_i	(ln)$W_{i,-1}$	R^2	D.W.
YG*	-574.5	21.45	-1.48			0.96	0.98
	(-7.21)	(4.07)	(-0.25)				
lnYG*	-1.14	1.74	0.11			0.95	0.83
	(-2.30)	(3.29)	(0.20)				

Notes: All regressions shown are either linear or double-log forms, as indicated by the form of the dependent variable.

EG* = employment in the goods* sector
YG* = output from the goods* sector
Z = per capita GDP
W_i = average annual wage in sector i
DW = Durbin-Watson statistic
Figures in parentheses are t-statistics

TOTAL SERVICES (S)

Dependent Variable	Independent Variables: Constant	(ln)Z	(ln)Z_{-1}	(ln)W_i	(ln)$W_{i,-1}$	R^2	D.W.
ES	651.7	52.28		-7.28		0.96	1.02
	(1.50)	(19.18)		(-2.90)			
lnES	5.52	1.30		-0.58		0.96	1.03
	(5.94)	(18.00)		(-3.04)			
ES	79.46		55.89	-4.76		0.96	1.56
	(0.16)		(17.66)	(-1.81)			
lnES	4.42		1.32	-0.38		0.96	1.47
	(4.55)		(17.30)	(-2.01)			
ES	485.1	27.86	26.16	-6.64		0.97	1.10
	(1.06)	(2.32)	(1.99)	(-2.76)			
lnES	5.18	0.64	0.67	-0.52		0.97	1.10
	(5.40)	(1.97)	(1.99)	(-2.81)			
ES	160.9		58.02		-5.93	0.97	1.95
	(0.39)		(18.25)		(-2.40)		
lnES	4.53		1.37		-0.44	0.96	1.91
	(5.30)		(17.47)		(-2.44)		
ES	240.5	18.05	38.61		-6.11	0.97	1.62
	(0.61)	(1.56)	(3.02)		(-2.60)		
lnES	4.67	0.37	1.00		-0.46	0.97	1.67
	(5.50)	(1.19)	(3.06)		(-2.59)		
YS	-1066.1	30.49				0.98	0.86
	(-14.35)	(26.08)					
lnYS	-2.50	2.23				0.98	1.01
	(-7.76)	(28.53)					
YS	-1215.8	33.89				0.96	1.52
	(-10.51)	(18.20)					
lnYS	-2.91	2.34				0.97	1.81
	(-6.56)	(21.72)					

contd.

Dependent Variable	Constant	(ln)Z	(ln)Z_{-1}	(ln)W_i	(ln)$W_{i,-1}$	R^2	D.W.
YS	-1152.7	21.57	10.59			0.98	0.86
	(-13.99)	(3.96)	(1.76)				
lnYS	-2.77	1.30	1.00			0.99	1.08
	(-8.80)	(3.90)	(2.89)				

Notes: ES = employment in the service sector
YS = output from the service sector

COMMERCIAL SERVICES (CS)

Dependent Variable	Constant	Independent Variables (ln)Z	(ln)Z_{-1}	(ln)W_i	(ln)$W_{i,-1}$	R^2	D.W.
ECS	333.1 (2.51)	17.82 (21.11)		-2.47 (-2.61)		0.97	1.21
lnECS	4.34 (7.08)	1.03 (20.26)		-0.32 (-2.58)		0.97	1.20
ECS	96.76 (0.57)		18.99 (17.27)	-0.996 (-0.91)		0.96	1.62
lnECS	3.46 (4.85)		1.04 (17.71)	-0.148 (-1.11)		0.96	1.56
ECS	328.17 (2.09)	12.14 (2.91)	5.80 (1.26)	-2.37 (-2.40)		0.98	1.55
lnECS	4.31 (6.32)	0.63 (2.57)	0.39 (1.48)	-0.30 (-2.40)		0.97	1.54
ECS	279.9 (2.27)		19.30 (21.86)		-2.47 (-2.94)	0.97	1.34
lnECS	4.18 (8.06)		1.06 (22.49)		-0.31 (-3.05)	0.98	1.30
ECS	299.8 (2.79)	7.29 (2.28)	11.43 (3.23)		-2.46 (-3.36)	0.98	0.80
lnECS	4.24 (8.98)	0.36 (1.94)	0.69 (3.46)		-0.31 (-3.40)	0.98	0.85
YCS	-254.6 (-5.35)	9.49 (12.66)				0.91	0.88
lnYCS	-1.07 (-1.98)	1.66 (12.68)				0.91	0.96
YCS	-289.2 (-4.36)		10.36 (9.70)			0.87	1.13
lnYCS	-1.20 (-1.65)		1.71 (9.65)			0.87	1.08

contd.

Dependent Variable	Constant	Independent Variables (ln)Z	(ln)Z_{-1}	(ln)W_i	(ln)$W_{i,-1}$	R^2	D.W.
YCS	-264.1	8.58	1.09			0.90	0.87
	(-4.38)	(2.15)	(0.25)				
lnYCS	-1.05	1.41	0.25			0.90	0.92
	(-1.58)	(1.99)	(0.34)				

Notes: ECS = employment in the commercial services sector
YCS = output from the commercial services sector

SOCIAL SERVICES (SS)

Dependent Variable	Constant	Independent Variables (ln)Z	$(ln)Z_{-1}$	$(ln)W_i$	$(ln)W_{i,-1}$	R^2	D.W.
ESS	120.64	33.33		-3.33		0.95	0.87
	(0.42)	(16.75)		(-2.48)			
lnESS	4.34	1.44		-0.56		0.94	0.88
	(3.82)	(15.06)		(-2.55)			
ESS	-171.1		36.33	-2.51		0.95	1.34
	(-0.57)		(16.53)	(-1.94)			
lnESS	3.36		1.49	-0.41		0.95	1.27
	(3.03)		(15.22)	(-2.02)			
ESS	-38.77	13.96	21.32	-2.95		0.96	0.90
	(-0.13)	(1.57)	(2.17)	(-2.35)			
lnESS	3.76	0.50	0.98	-0.47		0.95	0.96
	(3.26)	(1.14)	(2.11)	(-2.28)			
ESS	-329.1		37.14		-2.01	0.95	1.77
	(-1.14)		(15.05)		(-1.42)		
lnESS	2.70		1.53		-0.31	0.94	1.69
	(2.41)		(13.57)		(-1.38)		
ESS	-279.4	10.29	26.09		-2.12	0.95	1.50
	(-0.96)	(1.07)	(2.45)		(-1.50)		
lnESS	2.82	0.31	1.22		-0.33	0.94	1.54
	(2.43)	(0.65)	(2.45)		(-1.42)		
YSS	-811.4	20.99				0.96	0.74
	(-11.85)	(19.49)					
lnYSS	-4.72	2.63				0.95	0.63
	(-7.58)	(17.49)					
YSS	-926.6		23.53			0.95	1.21
	(-10.42)		(16.45)				
lnYSS	-5.35		2.81			0.95	1.15
	(-7.56)		(16.34)				

contd.

Dependent Variable	Independent Variables: Constant	(ln)Z	(ln)Z_{-1}	(ln)W_i	(ln)$W_{i,-1}$	R^2	D.W.
YSS	-888.6	12.99	9.49			0.97	0.72
	(-11.59)	(2.56)	(1.69)				
lnYSS	-5.21	1.20	1.56			0.96	0.69
	(-7.81)	(1.70)	(2.08)				

Notes: ESS = employment in social services
YSS = output from social services

APPENDIX 7.2 REGRESSION RESULTS OF EMPLOYMENT MODEL: EMPLOYMENT CHANGES

Dependent Variable	Independent Variables: Constant	$\Delta(\ln)Z$	$\Delta(\ln)Z_{-1}$	$\Delta(\ln)W_i$	$\Delta(\ln)W_{i,-1}$	R^2	D.W.
ΔEG*	0.92	-0.06		0.19		0.11	1.88
	(1.99)	(-0.12)		(1.25)			
ΔlnEG*	0.91	-0.04		0.14		0.12	1.84
	(3.46)	(-0.15)		(1.30)			
ΔEG*	1.76		-0.66		-0.03	0.16	0.79
	(3.82)		(-1.42)		(-0.18)		
ΔES	1.00	0.32		-0.29		0.35	3.05
	(4.41)	(1.48)		(-2.45)			
ΔlnES	1.02	0.16		-0.18		0.35	3.06
	(8.31)	(1.41)		(-2.40)			
ΔECS	0.82	0.12		0.09		0.21	1.49
	(6.16)	(0.85)		(1.15)			
ΔlnECS	0.88	0.06		0.06		0.23	1.50
	(11.35)	(0.74)		(1.14)			
ΔECS	0.92		0.24		-0.13	0.21	1.57
	(6.68)		(1.49)		(-1.58)		
ΔlnECS	0.96		0.13		-0.09	0.25	1.61
	(12.34)		(1.51)		(-1.63)		
ΔESS	1.14	0.30		-0.41		0.42	3.11
	(3.32)	(0.96)		(-2.98)			
ΔlnESS	1.12	0.17		-0.28		0.39	3.18
	(5.58)	(0.93)		(-2.89)			
ΔESS	1.26		0.17	-0.40		0.40	3.11
	(3.46)		(0.52)	(-2.82)			
ΔlnESS	1.20		0.08	-0.28		0.39	3.17
	(5.63)		(0.41)	(-2.74)			

contd.

Notes: All regressions shown are either linear or double-log forms, as indicated by the form of the dependent variable.

ΔEG^* = increase in employment in the goods* sector between t-1 and t. Similarly for ΔES etc.

$\Delta lnEG^*$ = increase in the log of employment in goods* between t-1 and t. Similarly for $\Delta lnES$ etc.

$\Delta(ln)Z$ = increase in (the log of) per capita GDP between t-1 and t.

$\Delta(ln)Z_{-1}$ = increase in (the log of) per capita GDP between t-2 and t-1. Similarly for $\Delta(ln)W_i$ and $\Delta(ln)W_{i,-1}$

For further notes see notes to Appendix 7.1

APPENDIX 7.3 MEASURING LABOUR PRODUCTIVITY

As a measure of efficiency in the use of resources, output per man is a rather crude indicator and cannot include the effects of such influences as changes in hours worked per week, changes in the quality of labour inputs or changes in the value of intermediate output. Differential changes in these variables between sectors can however affect rates of growth of sectoral productivity which cannot be identified by output per man figures. For example, a declining growth in output per man in services relative to goods may in fact represent greater efficiency in the use of resources in services if this is accompanied by a larger fall in hours worked per week in services so that output per man-hour is improving. In this appendix information on four potential influences on labour productivity are examined: hours worked, labour quality, intermediate outputs and methods of measurement of final output.

(a) Labour hours

Unfortunately insufficient data prevents an examination of whether or not differential changes in hours worked per week between 1960 and 1975 in goods and services occurred simultaneously with a declining output per man in services relative to goods. However some idea of the effects of differential changes in hours worked between sectors can be obtained from data available on two sub-sectors of the goods and service aggregates, namely 'manufacturing, mining and quarrying' and 'transport, communications and storage'. Indices for output per man (P) and output per man-hour (PH) are presented in Table A7.8 along with an index for manufacturing industry (including firms employing 10 or more persons) calculated by Mabro and Radwan (1976), for comparison. The PH measure is based on reported data on 'hours

paid for' per week which may not be identical with hours worked per week. It is assumed here that any difference between the two is similar across sectors.

The effects of using PH as a measure of productivity are most clearly seen by looking at the change in the indices for both sectors from 1960 to 1964. In Industry PH grows more than twice as fast as output/man (reaching 122.4 and 109.9 in 1964 respectively), but in Transport, Communications and Storage both indices increase at approximately the same rate till 1964. Thus a comparison of productivity between the two sectors will yield different results depending upon which measure is used. After the mid-'sixties however the trends in, and indeed magnitudes of, the relative growth of productivity between industry and transport communications and storage, using P and PH are very similar. Figure A7.1 shows the trends over the 1960-73 period of the industry/transport, communications and storage ratio for P and PH and it is clear that both measures follow a similar path. A χ^2 test of homogeneity for the two distributions (1960-73) proves insignificant, i.e. the hypothesis of homogeneity is accepted.

If the evidence for these two sectors could be generalised to the aggregate goods and service sectors it would imply that using output per man as a measure of productivity is inaccurate within each sector but is fairly accurate for comparisons between sectors. It is impossible to know (with present data) whether such a generalisation is possible or not but the evidence here tends to confirm rather than reject the validity of the output per man differentials discussed in Section 7.3 as a measure of relative sectoral productivity growth.

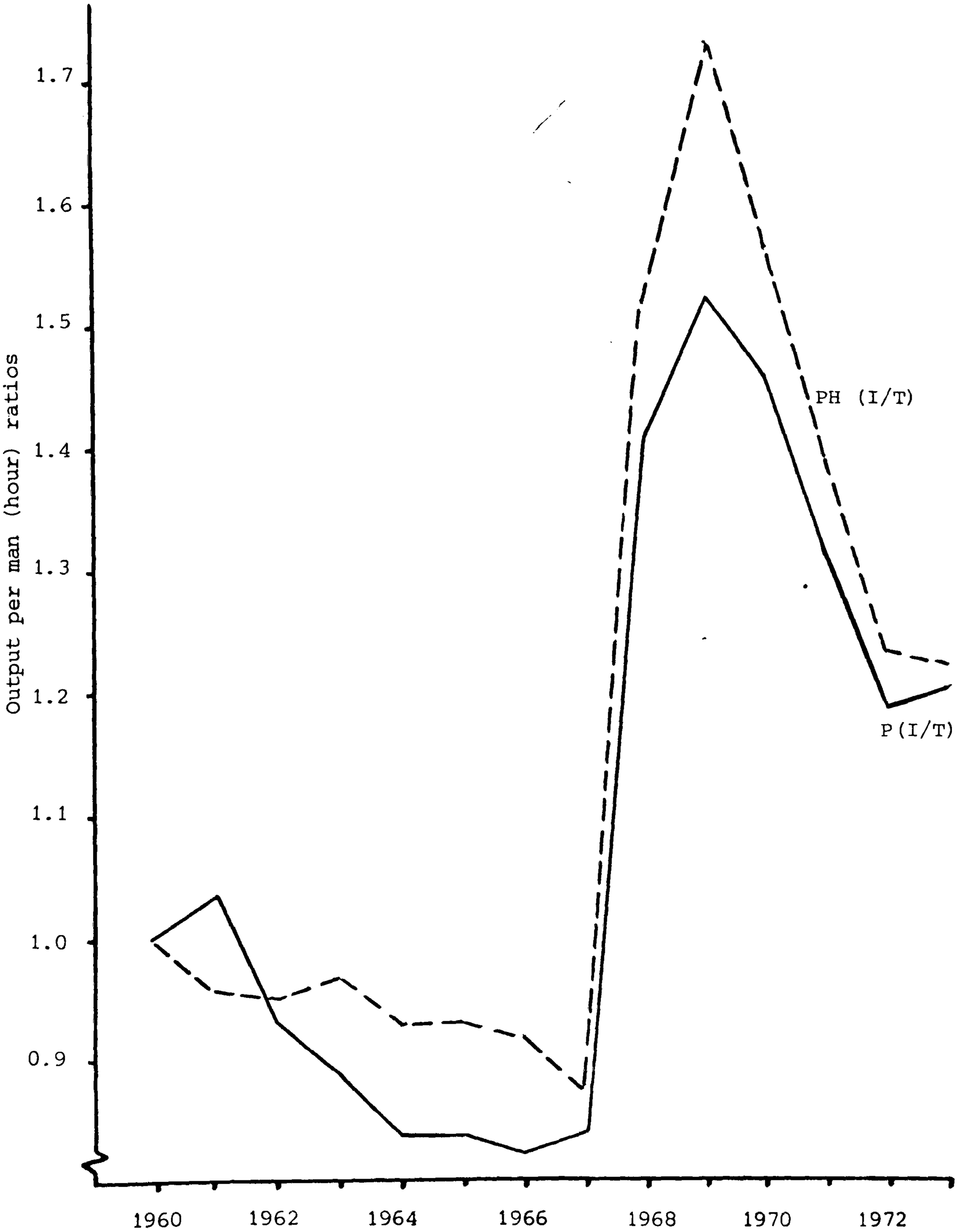
TABLE A7.8 INDICES OF LABOUR PRODUCTIVITY (1960 = 100)

	INDUSTRY		TRANSPORT, COMMUNICATIONS AND STORAGE		MANUFACTURING (MABRO & RADWAN)	
	(P)	(PH)	(P)	(PH)	(P)	(PH)
1960	100.0	100.0	100.0	100.0		
1961	107.2	99.1	103.5	103.7		
1962	107.2	111.7	115.0	117.4		
1963	106.5	118.6	120.0	122.6		
1964	109.9	122.4	131.2	131.3	100.0	100.0
1965	109.6	101.3	130.6	108.5		
1966	110.0	103.7	133.3	112.7		
1967	110.2	110.2	130.7	125.6	85.2	72.1
1968	102.2	100.2	72.3	65.6		
1969	110.7	110.7	72.3	63.3		
1970	113.4	101.1	77.5	64.4	79.0	71.0
1971	108.3	97.1	82.1	69.4		
1972	107.6	97.7	90.3	79.0		
1973	100.2	86.1	83.0	70.1		
1974	119.1	-	86.9	-		
1975	124.1	-	119.9	-		

Source: I.L.O. Yearbook of Labour Statistics, Geneva (various issues)

and Mabro and Radwan (1976)

FIGURE A7.1 RATIOS OF OUTPUT PER MAN AND OUTPUT PER MAN HOUR IN INDUSTRY AND SERVICES



Note: P (I/T) = Ratio of output per man in Industry to output per man in Transport and Communications

t per man hour in Industry to output

(b) Labour Quality

Possible differential changes in the quality of labour between sectors are more difficult to estimate due mainly to the conceptual inadequacy of various statistical indicators. Education levels are often assumed to give some idea of 'general' quality but may not be a sufficient measure of particular skill levels. The number of years technical training received by an engineer for example may provide more information on his skill level than the number of degrees or school certificates held by clerical workers would provide on theirs. Nevertheless in some LDCs where illiteracy is still common in the labour force, education which brings basic literacy can have a significant impact on productivity. Available information on labour force education levels in agriculture, manufacturing and social services is presented in Table A7.9. Figures are derived from the 1960 Population Census and the 1966 Sample Census of Population. For this reason the 1966 figures may not be accurate and indeed the suggestion in column (5) that the proportion of the total labour force in services fell by almost 3 percentage points from 16.1% to 13.3%, over the six years, contradicts other official employment estimates.

What is interesting however is that the fall in the share of the labour force in services with university degrees is more than the reported fall in total labour force, while in agriculture and manufacturing, the share of employees with university degrees and intermediate certificates or below, is increasing faster than total labour force. Thus, agriculture and manufacturing have increased their share of the more educated labour between 1960 and 1966 (and lowered its share of illiterates in the case of manufacturing) partly at the expense of social services, in which the share of the more

TABLE A7.9 PERCENTAGE DISTRIBUTION OF LABOUR FORCE BY SECTOR AND EDUCATION STATUS (10 YEARS AND OVER) 1960 AND 1966

		(1) Illiterate	(2) Literate	(3) Intermediate and below Intermediate Certificates	(4) University Degrees	(5) Total Labour Force
Agriculture	1960	71.4	39.9	6.7	2.2	57.3
	1966	71.6	35.3	8.2	7.9	55.3
% change		0.03	-11.5	22.4	259.1	-3.4
Manufacturing	1960	7.5	15.3	11.5	5.0	9.9
	1966	9.5	20.9	18.2	11.2	13.5
% change		27.6	36.6	58.3	124.0	36.4
Social Services	1960	8.7	21.4	52.2	75.6	16.1
	1966	6.4	17.9	43.0	61.0	13.3
% change		-26.4	-16.4	-17.6	-19.3	-17.4

educated labour is tending to diminish (although the share of illiterates in these services is also falling). This may imply a rise in the quality of the agricultural and manufacturing labour force relative to that in social services during this period, which arguably, would result in a tendency towards relatively higher productivity growth in these goods-producing sectors. The period covered by the education data, however, almost exactly coincides with the first period in Tables 7.6 and 7.7 in which social service output per man growth exceeded that in goods.

Without a breakdown of labour force data by sector and education level after 1966, it is not possible to determine whether changes in the qualitative aspect of each sector's labour force help to explain the relative decline in social service output per man. If the trend of the early 'sixties did continue, it may help to explain this post-1965 decline, but it is perhaps more likely that, with goods sector employment growth proceeding much slower after 1965, the trend towards a higher proportion of educated labour in the goods sector diminished. In either case, the extent of the shift in labour quality between sectors is unlikely to explain the whole of the change in output per man differentials after 1965.

(c) Intermediate Outputs

The effect of differential growth rates of intermediate output between sectors can be to obscure the true relative growth rates of output and output per man. Associated with the process of development in LDCs a growth in intermediate output of goods and service industries may be expected as an evolving industrial structure and import substitution policies lead to vertical integration in many industries. A priori it is not possible to say whether intermediate goods or services are likely to grow fastest,

but in the early stages of development, when the demand for intermediate goods and services arises mostly from within the goods producing sector, it is perhaps most likely that intermediate goods demand will tend to grow faster than the demand for intermediate services. However, this will vary from country to country depending for example, on the type of industrial structure which is being encouraged. If intermediate demands have risen faster in the goods sector in Egypt this will move the differentials in output, and output per man presented in Tables 7.7 and 7.8, more in favour of the goods sector. To have any effect on the explanation of the relative employment growth in services, however, it would be necessary to show that this excess of goods sector intermediate output growth (if it exists) is either accelerating or decelerating over the period. Unfortunately no evidence is available on this. Hanafi and Mongi (1975) have estimated that the share of intermediate production in total manufacturing output rose from 29% in 1960 to 43% in 1965, but there are no equivalent estimates thereafter, or for the service sector.

(d) Measuring Final Output

It has been noted in previous chapters that an important source of error when comparing output of the social service sector with that of the goods sector arises from the concept of 'output'. In 1974, 68% of GDP in 'social services' was produced under public ownership, while the remaining 32% was in private hands, most of this in the form of personal services. Thus, for the majority of social services such as education, health, government administration etc. GDP does not measure 'real' outputs, but inputs (of which, the largest share is wages). Normally, to allow comparisons between goods

and these social service outputs it is assumed that, in services, real outputs vary in proportion to inputs (GDP) so that, for example, a 10% rise in social service GDP represents, or will produce, a 10% rise in 'real' outputs from that sector. GDP data for these services as for goods, excludes inputs of raw materials and intermediate goods and services from other sectors and, although in the goods sector real output can be fairly accurately measured by the value added to these inputs, in some social services real output may vary with these raw materials and intermediate inputs. For example, the real output of health services may be influenced more by a rise in the number of beds than by a rise in the average wages or even numbers of health service employees, yet the former which represents an intermediate input is excluded from GDP, while the latter in this case is included. If the share of GDP in gross production (inputs plus value added) remains constant over time, then taking GDP or gross production to estimate the growth of real output in social services will not affect estimates of <u>changes</u> in output or output per man. However, in Egypt between 1960 and 1975 there was a very clear downward trend in the share of GDP in gross production for social services, while the goods sector share remained fairly constant.

If GDP is considered a more accurate indicator of real output than gross production in social services, then the comparisons in Tables 7.6 and 7.7 can be accepted more readily. Conversely, if gross production more accurately represents real output (and it would seem in some cases that it does), the trend in the GDP/Gross production ratio implies that output and output per man growth in social services is higher relative to goods than previously shown. However, the decline

in the GDP/GP ratio in social services is fairly uniform from 1960, so that the output and productivity differentials before and after 1965 should be similarly altered, and so would not significantly affect the trend in these differentials over the whole 15 year period.

Therefore despite the inadequacy of output per man as a measure of productivity, it appears that conclusions regarding the relative importance of output and productivity growth differentials would not be significantly changed if other factors affecting productivity differentials such as differential changes in hours worked or labour quality could be systematically included. It should be emphasised, however, that it is not suggested that the cause of the relative decline in productivity in some services can be attributed to labour. A fall in output per man need not be the fault of the labour employed, but results rather from changes in any of the factors combined in production. As Mabro and Radwan (1976) have rightly observed - 'Partial measures of productivity growth are concerned with the relation between output growth and variations in the quantity of a specific input. They attribute changes in output, but not the cause of these changes, to the factors of production singled out. The cause in most cases, is to be sought elsewhere', (p. 145).

C H A P T E R 8

DEMAND, PRODUCTIVITY AND THE GROWTH OF SERVICES: FURTHER RESULTS

8.1 INTRODUCTION

It is clear from the results of chapter 7 that in trying to understand the reasons for the recent relative expansion of service employment in Egypt, aggregate explanations are not valid. Regression analysis could not support the suggestion that income elasticities or relative factor prices could explain service employment growth. Likewise an examination of the association of employment growth differences between sectors with differences in output and productivity growth showed that this association was variable over time, and sensitive to the sector categories considered. For 1960-75 services do not appear to be consistently experiencing more rapid rises in output or slower productivity growth, which could help explain the relative employment growth.

It is also apparent that for some services at least causality can not be presumed to run from output and/or productivity to employment. In this chapter therefore the relative employment growth of particular service sectors is considered in more detail. The association of employment, output and productivity growth differentials is again used. It should be stressed however that in most cases these differentials cannot in themselves 'explain' service employment growth, but rather they facilitate identification of other influences. A list of potential influences on employment growth, for example, can be narrowed down by reference to information on output or productivity growth.

The evidence in this chapter is therefore to some extent 'impressionistic' and cannot always be backed by conclusive statistical data. Nevertheless it is possible in many cases to be reasonably conclusive on the factors causing Egypt's service sectors to grow.

The growth of commercial services employment is considered in Section 8.2, and social services employment in Section 8.3. Some conclusions are then drawn in Section 8.4.

8.2 COMMERCIAL SERVICES

The Commercial Services sector is composed of two sub-sectors for which separate data are available: Finance and Internal Trade (of which, in employment terms, wholesale and retail trade constituted 96% in 1960) and Transport and Communications (of which, in employment terms, road and rail transport constituted 67% in 1960).

Data for employment, output and productivity growth in these sectors are presented in Tables 8.1A and B and it is clear that the trends in these variables over the 1960-75 period are quite different across sectors. As in chapter 7 two measures of real output and productivity are used - Gross Domestic Product at constant 1960 prices (measure I), and at current prices (measure II). Both the Transport and Communications, and Finance and Trade sectors show increases in employment growth relative to both goods sectors from 1960-5 to 1970-5. However, whereas in Finance and Trade this is a smooth increase over the three periods, in Transport and Communications a large increase in relative rates of employment growth occurs in 1965-70 which decreases again in 1970-5 though relative employment growth remains considerably above that of the first five years. Also, compared to the goods sector, employment growth in Transport and Communications is higher in all three periods, but for Finance and Trade this only occurs in 1970-5.

Differences in output and productivity growth trends are also evident in Tables 8.1A and B. For Transport and Communications the figures suggest that both output and productivity growth was much slower than in goods (or goods*) during 1965-70, having grown

TABLE 8.1A EMPLOYMENT(E), OUTPUT(Y) AND PRODUCTIVITY(P) DIFFERENTIALS IN TRANSPORT AND COMMUNICATIONS (T&C) AND GOODS SECTORS, 1960-75

	1960-5			1965-70			1970-75		
	E	Y_I	Y_{II}	E	Y_I	Y_{II}	E	Y_I	Y_{II}
(1) (T&C) - Goods	0.7	5.2	5.0	2.6	-8.5	-10.7	1.3	9.1	-0.9
(2) (T&C) - Goods*	-3.2	2.8	4.0	0.7	-9.6	-10.8	-1.3	7.6	-0.4
	E	P_I	P_{II}	E	P_I	P_{II}	E	P_I	P_{II}
(3) (T&C) - Goods	0.7	4.3	4.2	2.6	-11.0	-13.2	1.3	7.5	-2.2
(4) (T&C) - Goods*	-3.2	5.7	7.0	0.7	-10.3	-11.5	-1.3	8.6	0.8

TABLE 8.1B EMPLOYMENT(E), OUTPUT(Y) AND PRODUCTIVITY(P) DIFFERENTIALS IN FINANCE AND TRADE (F&I) AND GOODS SECTORS, 1960-75

	1960-65			1965-70			1970-75		
	E	Y_I	Y_{II}	E	Y_I	Y_{II}	E	Y_I	Y_{II}
(1) (F&I) - Goods	-1.4	-2.7	-3.2	-0.1	1.0	0.4	2.0	7.1	6.3
(2) (F&I) - Goods*	-5.3	-5.1	-4.2	-2.0	-0.1	0.3	-0.6	5.6	6.8
	E	Y_I	Y_{II}	E	Y_I	Y_{II}	E	Y_I	Y_{II}
(3) (F&I) - Goods	-1.4	-1.2	-1.6	-0.1	1.2	0.5	2.0	4.8	4.1
(4) (F&I) - Goods*	-5.3	0.2	1.2	-2.0	1.9	2.2	-0.6	5.9	7.1

substantially faster for the previous five years. 1970-5 sees a return towards the earlier position of output and productivity growing faster relative to goods* (though less markedly when agriculture is included), but somewhat less than the differentials were during 1960-5. For Finance and Trade however Table 8.1 shows that the acceleration in employment growth relative to the goods* (and goods) sectors is associated unambiguously with increasing output and productivity differentials, employment growth differentials increasing less than output growth differentials because of the advances in relative productivity growth in Finance and Trade.

8.2.1 Transport and Communications

The rapid decline of output and output per man in Transport and Communications during 1965-70 is almost entirely due to the cessation of the flow of revenues from the Suez Canal as a result of the June 1967 war with Israel, when the loss of the Sinai peninsula forced the prolonged closure of the canal. The size of the Suez Canal 'industry' was very small in employment terms (in 1965 it constituted under 4% of Transport and Communications sector employment), but it contributed about 50% of total value added in the Transport and Communications sector in 1965. The effect of the war therefore was to drastically reduce value added but with little effect on employment growth in the Transport and Communications sector as a whole. Thus, the apparent fall in output per man can hardly have been the cause of the relative employment growth in this service sector since productivity fell in a different part of the sector from that which contributed most to employment growth.

Output and productivity differentials recovered during the 1970-5 period but if, as previously suggested, measure II is the more

accurate, this still represents a fall over the first half of the 1960s. Thus, although output growth has declined relative to goods since 1965, relative employment growth increased with an even larger fall in relative productivity growth. It would seem, therefore, that the Transport and Communications sector partially recovered after the 1967 war, despite the continuing loss of canal revenues, because of the growth of internal transportation and communications facilities. However, relative output growth is still slow compared to the early 'sixties and this would seem to be the result of at least three factors.

Firstly, the continued loss of canal revenues, plus the effects of the 1973 war, served to reduce the growth in output, but without similar effects on the sector's employment.

Secondly, the growth in employment in the Transport and Communications sector has undoubtedly been affected by the expansion of Egypt's urban 'informal' sector over the period, encouraged by the lack of job opportunities in the non-agricultural goods sector.[1] This growth of the informal sector will be discussed in more detail later, but it is sufficient to point out here that in the transport sector particularly, the expansion of employment through informal activities may have added little to output so helping to explain the slow productivity growth. Mongi and Hanafi, who by living with these problems may possess greater insight, point to the importance of disguised unemployment in the form of 'followers' - 'people who accompany transportation wagons, helping in loading and unloading' (Hanafi and Mongi (1975, p. 299)). In an economic sense, these people are superfluous to needs, but are able to maintain their jobs because of public sector employment policy.[2]

Thirdly, a lack of adequate capital replacement and modernisation in the Transport and Communications sector has probably hindered output growth. Losses of road and rail equipment such as buses and carriages through wars, internal violence and general wear and tear have often not been made good because of higher priorities (rightly or wrongly) for limited government finance, or foreign exchange constraints prohibiting importation of the necessary equipment.

These three factors would explain why employment continued to grow in Transport and Communications despite limited output growth, exceeding that of goods sector employment because of the growth of 'informal' activities, particularly in the 1970s, which beset the Transport and Communications sector (both public and private) more than goods.

8.2.2 Finance and Trade

It was noted earlier that in contrast to Transport and Communications, relative employment growth in Finance and Trade after 1965 was associated with faster productivity and particularly, output growth. This has occurred for various reasons. Firstly, the trade sector, along with agriculture, was one of the least affected sectors by the 1967 war so that output growth fell less during 1965-70 than was the case in the goods-producing sectors. This was partly a direct consequence of the relative output growth in agriculture, since wholesale and retail trade acts as much as an outlet for agricultural as for industrial commodities. However, during the 1970s when almost all sectors experienced faster rates of output growth, the Finance and Trade sector also experienced a relative output growth compared with the goods sectors, suggesting that the overall post-1965 growth in this sector is more than a phenomenon created by the war.

The trade sector has experienced a growing demand for consumer goods to which it has been more able to respond. A rapidly growing population and the expansion of agricultural output, and imports, to meet their needs, have increased output and employment in retail trade, while the growing demand in Egypt over the period, noted by various commentators, for western luxury consumer goods, has also had an expansionary effect on retail trade. The main streets of Cairo and Alexandria increasingly house retail outlets selling modern manufactured consumer goods, often imported, for the increasing numbers of middle-income consumers in Egypt. This increase in employment may, therefore, actually have been caused by output growth.

Thirdly, increases in informal activities have taken place perhaps mostly in the retail trade sector, so increasing employment disproportionately. This would not have the effect of reducing productivity to the extent that it did in Transport and Communications because the majority of informal activities in this sector are private, often self-employed, and those which can be captured by statistics are likely to be more profit orientated. For example, a casual worker employed to unload wagons in the public transport sector will be paid regardless of output, whereas for the private trader, his income is dependent on his sales. There is, of course, a growing number of publicly-owned department stores in the retail trade which, it is sometimes argued, suffer from overmanning as do other public services. It is quite possible however, that where these department stores substitute for small private traders, they may still be more efficient, with greater potential for increasing value added by aiming at Egypt's growing middle-classes.

Finally, the relative increase in Finance and Trade Sector employment would seem to be co-existent with rising output and productivity growth partly because of the increasing contribution, in terms of value added, of banking and insurance services. In 1965 banking and insurance formed only 5% of Finance and Trade employment but contributed 12% to value added in the sector. These services have developed since 1965 under government policy and, being fairly capital-intensive (relative to the rest of Finance and Trade sector), have added more to output than employment, increasing the rate of output growth associated with employment growth in the Finance and Trade Sector as a whole. The expansion in financial services is almost certainly related to Egypt's increasing openness to western banking interests, and to the demise of Beirut as the middle-east's major financial centre.

8.2.3 Informal Services

So far it has been argued that the growth in 'informal' activities in Egypt since the mid-'sixties is partly responsible for the increase in the relative growth in employment in commercial services and this can represent either productive employment or disguised unemployment. Since the I.L.O. (1972) report on Kenya much has been written on the informal sector both in general terms and with reference to specific countries. Some discussion of its role and composition in Egypt is however relevant here. By its nature the informal sector is difficult to define and indeed any definition is likely to be only a partial explanation but, within the service sector, this group of economic activities tends to be carried out by individuals who would otherwise be unemployed, but who attempt to maintain themselves and their families by such 'informal' or casual, often self-employed activities as street

vending, show cleaning and other 'waiting-on' services. Egypt's tourist industry provides many of them with jobs as guides (frequently self-appointed), porters, hotel attendants and many other such activities.[3]

Mabro (1974) has suggested that this phenomenon was evident in Egypt's service sector before 1960, and there can be little doubt that it has also played an important part in the expansion of trade and transport services since then. However, the development of some informal services certainly results from an effective demand for them and not simply as a product of excess labour supply. Bauer and Yamey for example have observed that transport and trade services may grow in this way in LDCs because of lack of storage space for poor producers and consumers, such that

> 'they may require the services of small-scale traders to collect small lots of farm produce at frequent intervals. Among large sections of the population there may have to be a number of traders catering for their needs by dealing in small quantities'. (Bauer and Yamey (1957, p. 39)).

In Egypt the informal sector has arisen firstly, because population growth in urban and rural areas has exceeded the growth in modern sector employment opportunities, and secondly, because many rural-urban migrants do not have the appropriate skills for the modern sector and create informal jobs for themselves.

It seems that these two factors intensified from the mid-'sixties - an increasing gap between population growth and modern sector jobs, and an increased migration problem. Some evidence of this can be found in the data in Table 8.2 which show changes in employment and urban population between 1960, 1966 and 1976 (the population census years). The average annual increases in employment in the goods*

sector (which is almost entirely 'modern' and urban) were substantially lower in the second period, while over the same periods the urban population increase rose slightly from an annual average of about 161,000 to 166,000. Transport and Communications employment increases also show a slowdown but in Finance and Trade where the private informal sector is more strongly represented, annual employment increases were about 35% higher in 1966-76 than they had been during 1960-6.

Of course not all of the urban population increase represents increases in the labour force. Abdel-Fadil (1975) has estimated net migration into the Cairo governate during 1960-5 to be around 274,000 most of whom will be members of the labour force. Although the remainder of Cairo's population growth will be mostly a natural increase, Egypt's population has been growing rapidly since the Second World War, causing a very large number of entrants into the labour force over this period resulting from earlier increases in population.[4]

Between 1966 and 1976, the rate of growth of Cairo's labour force (and that of the other urban governates) may have been declining but absolute numbers of new entrants were still rising. It is inevitable then, with the goods* sector failing to expand adequately that much of the excess labour supply would find ways into the informal sector and it does seem that employment statistics in commercial services have captured some of this increase.

8.2.4 Summary

In summary, the increase in Commercial Services employment relative to goods results from various factors but perhaps principally from the growth in informal services in this sector. In Finance and

Trade the simultaneous relative growth in output may reflect a large response to rising demand within this sector because it did not suffer from the same supply constraints as the goods sector. A growing population, and rising propensity for more expensive consumer goods have encouraged a considerable expansion in retail trade, much of it private and 'informal'.

In Transport and Communications the rising employment differential appears to result not only from a growth in private informal services, but also from disguised unemployment in the public sector. In the public sector much of the employment growth is the consequence of government social policy and has caused a relative decline in productivity and efficiency over the period. The 1967 war had a considerable though temporary, detrimental effect on output and productivity in this sector.

Thus the relative decline in productivity in Transport and Communications could hardly be said to have caused the sector's employment growth. Relative output growth in Finance and Trade however, though probably partly representing a relative growth in demand (which encouraged employment growth), is more accurately to be seen as a supply factor. Finance and Trade suffered from fewer supply constraints than particularly the non-agricultural goods sector, so that it has been more able to meet increases in demand.

8.3 SOCIAL SERVICES

Because of limited disaggregation of available employment data, this sector includes a proportion of private 'personal' services such as restaurants, tailors etc., (which would be more appropriately classified with commercial services), and social services (education, health, recreation, administration etc.) 87% of which, in employment

terms, were publicly-owned in 1960. This data deficiency makes it difficult to assess trends in each of these two services over the whole 1960-75 period. However it can be ascertained that the contribution of private services (which are mostly personal) to value added in the total social service sector fell from 42% in 1960 to 33% in 1965, but only a further 1 percentage point to 32% over the nine years to 1974.[5] Employment data show a similar pattern to that of value added between 1960 and 1965 and if this continued even approximately after 1965 then the share of private in total social services probably fell very little after that date. In terms of actual numbers employed this implies that the fairly static employment levels in private social services between 1960 and 1965 began to increase at a rate not much less than that of public social services after 1965, i.e. the relative growth of social service employment was both a private and a public phenomenon. Indeed it does seem that the static employment level and declining share of service employment experienced by private social services during 1960-5 was peculiar to this period while both prior and subsequent to it, employment was growing faster than in the goods sector. Mead (1967) notes the large employment increase between 1947 and 1960 in 'Personal Services not elsewhere Classified' (corresponding to the 'personal services' category here) which he considers to be 'a clear case of the spread of agriculture under-employment into the services', (Mead, 1967, p. 153)), i.e. the informal sector.

Turning to the causes of social service growth evident in available employment statistics, Table 8.3 presents estimates of employment, output and output per man growth differentials between social services and both goods sectors. It would, of course, be false to think that changes in relative output or productivity

TABLE 8.2 AVERAGE ANNUAL INCREASES IN EMPLOYMENT AND URBAN POPULATION 1960-66 AND 1966-76 (THOUSANDS)

	URBAN POPULATION	GOODS* EMPLOYMENT	COMMERCIAL SERVICE EMPLOYMENT		
			T&C	F&I	TOTAL
(1) Annual Average 1960-66	161.7	71.4	14.9	19.5	34.3
(2) Annual Average 1966-76	166.2	65.3	11.4	26.4	37.8
(3) Ratio(2):(1)	1.03	0.91	0.74	1.35	1.10

TABLE 8.3 EMPLOYMENT, OUTPUT AND PRODUCTIVITY DIFFERENTIALS IN GOODS AND SOCIAL SERVICE (SS) SECTORS

	1960-5			1965-70			1970-5		
	E	Y_I	Y_{II}	E	Y_I	Y_{II}	E	Y_I	Y_{II}
(1) SS - Goods	-0.1	1.9	0.7	1.9	2.7	1.1	2.9	5.6	2.1
(2) SS - Goods*	-4.0	-0.5	-0.3	0.0	1.6	1.0	-0.3	4.1	2.6
	E	P_I	P_{II}	E	P_I	P_{II}	E	P_I	P_{II}
(3) SS - Goods	-0.1	1.9	0.8	1.9	0.8	-0.8	2.9	2.5	-0.8
(4) SS - Goods*	-4.0	3.3	3.6	0.0	1.5	0.9	-0.3	3.6	2.2

could explain employment growth in this sector because of the way in which GDP is calculated for public social services. Rising GDP in Government Administration for example is particularly difficult to interpret. However, the figures do provide some insights into the underlying influences on social service employment growth.

It is apparent from the table that the relative employment growth is primarily associated with a relative decline in productivity in 1965-70 and a relative rise in output in 1970-5.[6] For example, in line (1), the 2 percentage point rise in the employment differential (from -0.1% to 1.9%) between 1960-65 and 1965-70 is associated with only a 0.4 percentage point rise in output, but a 1.6 percentage point fall in output per man. A further 1 percentage point rise in the employment differential in 1970-75 occurs with a 1 percentage point rise in the output differential (from 1.1% to 2.1%) with the productivity differential remaining constant at -0.8%.[7]

This association of relative employment growth with a relative productivity decline may help to explain the nature of the employment growth experienced by social services. Firstly, as previously noted the sharp decline in the private sector's share of total social services during 1960-65 had been much reduced, if not halted after 1965 which represented a rise in enumerated employment in this sector. Since this private sector, producing mostly personal services, is less productive than the public social service sector (in terms of GDP per head), this would serve to reduce productivity growth experienced by the social service sector as a whole.[8]

Secondly, it is likely that much of the employment increase in the public sector was in the form of low-wage employment (and therefore lower GDP-creating employment because of the way in which GDP is calculated in this sector), which would reduce the

rate of productivity growth relative to employment. Between 1960 and 1965 employment in Government Administration grew faster than any other public social service sub-sector (with the exception of 'cultural and recreational services' which are negligible in size), followed by health services. While the growth in health services is a valuable achievement in a country with poor health facilities and rapid population growth, it is very unlikely that the growth in employment in Egypt's already large bureacuracy was matched by a similar growth in real output, and there is no evidence that such an expansion in employment was necessary. Hanafi and Mongi (1975) point out that this increase in employment, amounting to an average of 21% per annum over the five year period, was associated with an average increase in total real wages in the sector of only 12% per annum. This cannot be entirely explained by a failure of money wages to keep pace with inflation, but they suggest, 'may be due to either employing a considerable number of unskilled labour or to the increase of young workers with relatively moderate start wages, or due to both reasons together'. (p. 286). Without more detailed information on the development of employment in Government Administration, we cannot be sure that this is the cause, nor whether this trend continued after 1965. The relative decline in social service productivity to 1970 would certainly be consistent with this. By the same reasoning, however, the rise in output and (possibly) productivity differentials after 1970 is not consistent with low-wage employment expansion. Two factors may account for this rise after 1970. Either a larger expansion in high-wage employment which gives the appearance of faster productivity growth may have occurred after 1970, or if the share of Government Administration in total social service output fell, to be replaced, say, by private services, then the influence of wages in Government Administration would be less evident in social

service output and productivity movements. In fact, as will be shown, there is evidence that both these factors are likely to have operated during the early 1970s. Firstly, however, causes of the expansion of Egypt's public social services sector, will be considered.

8.3.1 Public Social Services

The causes of expansion in this sector can perhaps best be summarised in three categories - public employment policies, policies towards education and urbanisation/migration effects.

The cornerstone of the government's employment policy in the early 'sixties was to reduce hours worked per man in the public sectors of the economy and increase their employment levels so that hopefully costs would remain steady but unemployment would fall. This was the reasoning behind the employment drive begun in 1961 causing manufacturing industry and government administration particularly to increase their labour forces significantly after that date. Unfortunately, opportunities to reduce hours worked per man by banning overtime had little effect in Government Administration where there is little use of overtime, and in manufacturing, as Mabro and Radwan discovered, unofficial ways to compensate workers for lost earnings were discovered, until eventually, rigidities created by the ban were sufficient to force the government to remove it.[9] At the same time, legislation preventing the sacking of employees meant that new employees absorbed into the public bureacuracy, most of whom (if not all) were not needed, became a permanent burden on public finance. The aim of this arm of policy was to solve much of the mass unemployment problem and thus resulted in increased absorption of unskilled, low-wage labour. Government Administration was particularly susceptible to this type of employment creation.

The government's policy towards education has also had a significant impact on the growth in the bureaucracy. Moroe Berger, writing in 1954, observed:

> 'It has been easier for underdeveloped areas to expand their education facilities, especially in liberal arts and law, than to expand the economic opportunities for those who use those facilities. The resultant pressure for government jobs has swelled the ranks of the civil service far beyond the point of real need. This is true in Egypt. Secular education has, in fact, been identified, since its introduction by Muhammad Ali in the early nineteenth century, with government posts'. (Berger (1954, p. 68)).

The government has been committed since the 1961/2 Socialist Laws to employ all graduates, should they wish it, in the public sector and the rapid growth in the number of graduates seeking jobs as a result of the expansion in the education facilities in Egypt, particularly since the early 1960s, has meant an increasing flow into the civil service. After 1965 the scarcity of goods* sector jobs, both private and public seems to have led to an even greater proportion of graduates being employed in government administration. It appears also that one area of education policy designed to reduce the flow of graduates has, in fact, had the opposite effect. Legislation requires that school leavers may enter university only in the academic year immediately following their school-leaving examinations, otherwise they must re-sit these examinations again regardless of previous success. This was designed to dissuade many who would not normally go directly from school to university from entering at all but in fact, has tended to make some students apply directly to university even if they are not sure which kind of employment they will eventually want.[10]

In many cases a civil service job may be the easiest option for a graduate. Berger (1954) found after surveying 249 senior officials in the civil service, that the majority had entered because of a lack of other job opportunities, and that the younger civil servants interviewed in particular had considered other careers more seriously. This occurred despite the fact that nearly 80% of those interviewed found only a 'low' level of satisfaction from the job. Therefore it would seem that most graduates who enter the civil service do so, not necessarily because they are attracted by the work, but because there are few other opportunities for them, and those 'other opportunities' as shown earlier, were less from the mid-'sixties onwards.

Figures for the number of students graduating from universities over the 1960-75 period provide some insights into the pattern of Government Administration employment growth. These are presented in Figure 8.1. Government Administration tends to employ graduates from the Humanities Faculty rather than the Science Faculty since the latter have less difficulty in obtaining jobs in other sectors of the economy. Figure 8.1 indicates that science graduates have increased at a fairly steady rate over the period, while humanities graduates increased particularly rapidly between 1962 and 1967, and after 1972. The period from 1967 to 1972 on the other hand, experienced a relatively static annual level of humanities graduates. It is interesting to note that the available data on employment in Government Administration from 1960-5 show that absorption increased considerably from 1963, that is, the years when graduates in humanities also increased most rapidly. Some of the employment increase is of course, due to the employment drive. From the graduates figures then, it could be expected, ceteris paribus, that the proportion of graduates among new employees in government administration would be greater during

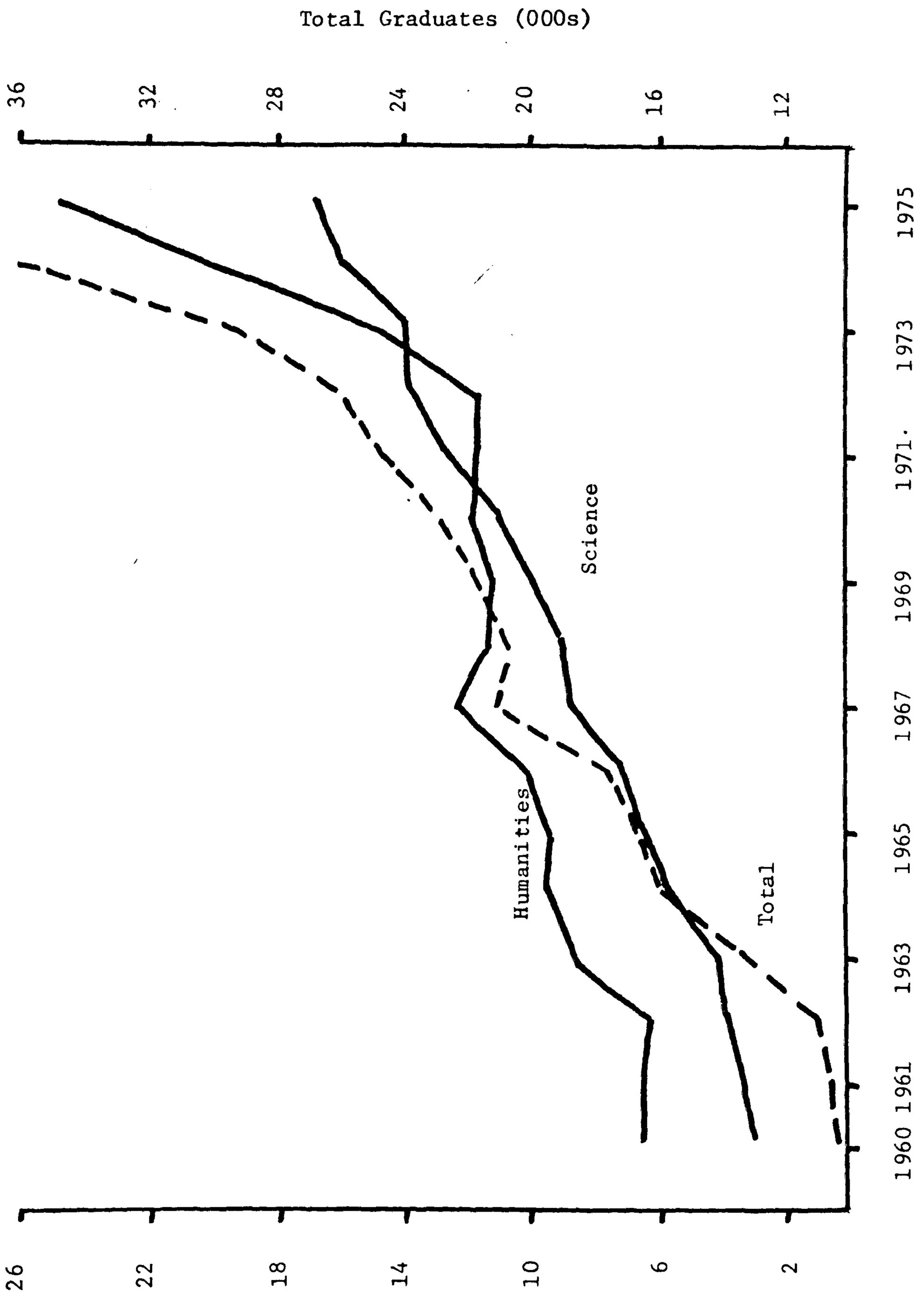


FIGURE 8.1 GRADUATES FROM EGYPTIAN UNIVERSITIES 1960-75

1962-67 and 1972-5 and less during 1967-72. Since graduates have a much higher average wage in government employment this will tend to increase the average wage for the sector as a whole during the former two periods, and reduce it in the latter. With output data for government administration reflecting data on total wages very closely, this may help to explain why the employment growth in the social service sector was associated with a relative productivity and output rise during the early 'seventies.

One of the effects of urbanisation of the type experienced in Egypt has been to increase the supply of unskilled labour and swell the numbers of unemployed and semi-employed. Some of this, as well as the more educated labour, has been absorbed by the public service sector. The growth in this type of labour can only be interpreted as a social welfare policy since these individuals, frequently illiterate, who abound in public buildings occasionally running errands or delivering messages, add virtually nothing to real output.

Finally, there is some evidence that Health and Education Services which are almost entirely publicly-owned, have contributed to the relative employment growth in social services over the 1960-75 period. Employment data are incomplete but it is known that the numbers of 'Physicians, Dentists and Pharmacists' for example grew faster after 1965 than before, causing the decline in the population per physician ratio to proceed after 1965 at a pace almost twice as fast as the 1960-5 rate.

In education, trends are not so clear-cut. Total teaching staff increased by an average of about 6% per annum during 1960-5 but only by 3% per annum thereafter. This decline is much less than the decline in employment growth in the goods sector. However, teaching staff formed only about 55% of total education sector employment in

1960 with teaching staff growing slightly slower than other categories during the 1960-5 period. Thus, growth rates in teaching staff both before and after 1965 may not give an accurate picture of the growth in education employment overall.

8.3.2 Private Services

Earlier it was argued that the association of faster employment growth in the social service sector after 1970 with faster output and productivity growth, could occur if the share of the public social service sector was falling in favour of a larger private sector, and if this private sector was experiencing faster output and productivity growth.

It was also noted earlier that the share of the public sector in social service value added fell from 42% in 1960 to 33% in 1965, but probably only about a further 1% to 32% by 1974. Thus the influences of public sector output and productivity trends on the social service sector as a whole would be very much less in 1965-75 than they were during 1960-5. This is confirmed by comparing various government social service expenditures (which obviously must be closely related to public social service GDP) to the total social service sector GDP, which suggests an increasing share of the public sector in social service output 1960-5, but a considerable reversal in the trend after 1965.[11] This, of course, does not confirm that faster output and productivity growth after 1970 was due to a greater influence of an expanding private sector, unless the private sector also experienced rising output and productivity growth. Some evidence on this can be obtained by pooling data from different employment and output sources in Table 8.4. The 1965-76 period is not strictly comparable with the earlier period but the results are in line with what would be expected and confirm

TABLE 8.4 OUTPUT, EMPLOYMENT AND PRODUCTIVITY GROWTH (%)

IN PRIVATE SOCIAL SERVICES

Period	Employment Growth	Output Growth	Productivity Growth
1960-5	0.1	2.8	2.7
1965-76	2.4*	7.3†	4.8

† 1976 dataare obtained by multiplying the proportion of value added produced privately in 1974 (0.318) in social services, to total social service GDP in 1976.

* Figures for public social services in 1976 were calculated from Survey of Employment in Government and Public Services in February 1977 by the Central Agency for Organisation and Administration. This was subtracted from annual data on employment in (total) social services in December 1976.

the suggestion that after 1965 the relative decline of private 'social' service employment was reversed and in particular, rates of output and productivity growth were much larger in the later period.

8.3.3 Summary

In summary therefore, it would seem that the relative growth in social service employment is principally of three types. Firstly, education and employment policy have particularly increased the numbers of graduates entering the civil service as well as the numbers of unskilled workers absorbed into the sector generally, with the consequent large rise in employment which seems unlikely to have been accompanied by a similar rise in real output. Secondly increased health and education facilities made available by public investment, have probably aided this relative employment growth in social services, though the extent of their influence is difficult to assess.

Thirdly, the growth of private services included in the social services data because of limited disaggregation, seems to be of two types: (a) increases in informal services, resulting from rising urban unemployment and underemployment, and (b) increases in more formal private services such as those serving the tourist industry. The rising output and productivity in these sectors, particularly during the 1970s, are likely to be more 'real' than those of the public sector.

8.4 CONCLUSIONS

This chapter has examined further some of the evidence of increasing employment in Egypt's service sectors relative to employment in goods-producing sectors. Using the relationship

between employment, output and productivity in each sector it was possible to identify possible sources of employment expansion.

Considering commercial and social services separately, it was argued that in both categories there was evidence of a relative growth in private 'informal' activities and public sector expansion from the mid-'sixties. (The growth in private 'social' services was however mainly because limited data disaggregation did not allow these services to be classified with commercial services, which would have been more appropriate).

In the commercial services sector, transport and communication services appear to have grown in association with declining productivity growth mainly because of disguised unemployment in the public sector and the disproportionate effects of the 1967 war. Slower productivity growth could hardly therefore be interpreted as causing faster employment growth in this case. Finance and trade on the other hand experienced rising output and productivity growth, relative to goods sectors over the period,which probably stems from the growing urban demand for agricultural and luxury goods which has boosted wholesale and retail trade services. These have been mostly private, though the public sector has probably also benefitted here.

The employment growth experienced by social services has also been a private and public phenomenon. Public services, as expected, are by far the largest in this sector and it was shown that Administration and Health services have been among the fastest growing. The available evidence suggests that, at least in Administration, much of this increase represents disguised unemployment arising from excessive graduate employment under Egypt's education policies, and sizable increases in low-wage

labour as part of social welfare policy. Part of the expansion has however, undoubtedly been a consequence of the governments' social goals of expanding health and education facilities to the majority of the population. It was shown in chapter 3 that expansion of these services, which together form a large part of the non-market sector, can have adverse consequences for the economy's macroeconomic performance. This aspect of Egypt's service expansion is examined in chapter 9.

Footnotes

1. A large proportion of the informal sector cannot, of course, be included in official statistics, but it seems certain that a large part of the employment growth in this sector is in the form of 'casual' or informal activities.

2. Some of these people may be more appropriately classed as 'semi-formal' since, although they may not be officially-recognised employees of the public sector, they are often paid on an ad hoc basis from public funds.

3. This is not to suggest that informal activities all fall within a 'service' category. Evidence from Kenya and elsewhere has shown that small scale manufacturing also takes place in the informal sector. This is also true for Egypt, as a recent study by Mead (1982) has shown.

4. According to a study by the Cairo Demographic Centre (1972), 51% of Cairo's labour force in 1968 had been born outside the city.

5. The public/private breakdown of GDP data 1960-5 and 1974 are from different sources and therefore may not be strictly comparable. 1960-5 data are from Hanafi and Mongi (1975, Appendix 2) and 1974 data are from National Bank of Egypt, Economic Bulletin, 1975(4), p. 378.

6. This is not necessarily the case using constant price data, but as previously discussed, current price data is probably more accurate.

7. The smaller rise in the employment differential during 1970-75 in line (2) arises mainly because of the effects of a large rise in construction employment during 1975.

8. This may of course represent increased efficiency in the use of resources if employment in commercially viable personal services grows at the expense of disguised unemployment in some public social services.

9. See Mabro and Radwan (1976, p. 137).

10. I am grateful to Dr. Hassan Abdel-Aziz of the I.N.P. in Cairo for this point.

11. Alternative measures of social service sector expenditure (including or excluding local and investment expenditures) all suggest a rise relative to GDP from 1960-5 but subsequent falls to 1970 and 1975.

C H A P T E R 9

THE ROLE OF THE NON-MARKET SECTOR IN EGYPT'S ECONOMIC GROWTH

9.1 INTRODUCTION

It was noted in chapter 3 that, following the work of Johnston (1975), Bacon and Eltis (1976) suggested that an excessive relative growth in the non-market sector of the British economy was responsible for the low rates of growth, persistent balance of payments deficits and rapid inflation in Britain since the mid-nineteen-sixties. In this chapter the marketed/non-marketed distinction is applied to the Egyptian economy in an attempt to explain similar problems which have been readily identifiable in Egypt for some years. First however some effects of interaction between the market and non-market sectors on productivity growth are considered. In Section 9.3 these interactions are examined in the context of the Egyptian economy over the period 1960-76 and a relative rise in the non-market sector is identified. The effects on output, employment and prices are considered in Section 9.4 and 9.5. Section 9.6 discusses some of the causes of non-market growth in Egypt and some conclusions are drawn in Section 9.7.

9.2 THE NON-MARKET SECTOR AND PRODUCTIVITY GROWTH

The market sector was defined in chapter 3 as the aggregate of all sectors producing outputs which are sold 'in the market place'. This includes all industrial and non-industrial goods whether produced under private or public ownership, and all services which are sold such as banking, insurance and distribution. The non-market sector includes all outputs not sold in the market place, that is, provided 'free' by government.

An increase in the relative size of the non-market sector, caused for example by a transfer of workers from the market to the non-market sector, will result in greater demands for market sector

goods and services by those who play no direct part in their production. The result is excess demand for market sector outputs.[1] This may be met by increased productivity in the market sector but the faster the relative growth of the non-market sector the higher will be the required rate of productivity growth to maintain equilibrium between supply and demand at constant prices.[2]

This can be shown by taking the identity, (3.4), derived in chapter 3:

$$Y_m \equiv C_m + I_m + G_m + B$$

where Y_m is marketed output, C_m and I_m are purchases of marketed output by firms and workers for consumption and investment respectively, G_m is government purchases of marketed output, and B is the balance of payment current account surplus. Differentiating (3.4) with respect to time and dividing throughout by Y_m, gives

$$\dot{Y}_m = \alpha_t C_m + \beta_t I_m + \gamma_t G_m + \delta_t B \qquad (9.1)$$

where α_t, β_t, γ_t and δ_t are the respective instantaneous shares of C_m, I_m, G_m and B in marketed output, Y_m, at time t, and dotted variables represent proportionate rates of change. However if P_m is productivity or output per man in the market sector and N_m is market sector employment, then,

$$Y_m = P_m . N_m \qquad (9.2)$$

Differentiating logarithmically with respect to time gives,

$$\dot{Y}_m = \dot{P}_m + \dot{N}_m \qquad (9.3)$$

Combining (6) and (8) the increase in productivity required to meet the demand for marketed output at constant prices will be

$$\dot{P}_m = \alpha_t \dot{C}_m + \beta_t \dot{I}_m + \gamma_t \dot{G}_m + \delta_t \dot{B} - \dot{N}_m \qquad (9.4)$$

Now assume there is a transfer of workers from the market to the non-market sector. Further assume that this results in a fall in C_m in proportion to the decline in market sector employment, while similarly, marketed output absorbed by the non-market sector, G_m, rises in proportion to the increase in employment. Thus, the departure of any worker from the market sector does not lead to an increase in the average consumption of those workers in the market sector. This implies that the following condition must hold

$$\dot{C}_m = \dot{N}_m = -\sigma_t \dot{N}_g = -\sigma_t \dot{G}_m \tag{9.5}$$

where $\sigma_t = N_g/N_m = G_m/C_m$, at time t, and N_g = non-market employment

This allows substitution of $\dot{N}_m$ and $\dot{C}_m$ in (9.4) to give (omitting time subscripts),

$$\dot{P}_m = (\gamma - \sigma(\alpha - 1))\dot{G}_m + \beta\dot{I}_m + \delta\dot{B} \tag{9.6}$$

Furthermore, if it is desired to maintain an existing equilibrium on the balance of payments, that is $\delta = 0$, $\dot{B} = 0$, the required rate of growth of market sector productivity becomes

$$\dot{P}_m = (\gamma - \sigma(\alpha - 1))\dot{G}_m + \beta\dot{I}_m \tag{9.7}$$

Clearly the required growth in productivity will increase as the process of transfer continues, that is as $\alpha \to 0$. At the beginning of the process (when $\gamma = 0$, $\sigma = 0$)

$$\dot{P}_m = \beta\dot{I}_m \tag{9.8}$$

As α tends to zero, $\dot{P}_m$ must rise to a maximum of

$$\dot{P}_m = (\sigma + \gamma)\dot{G}_m + \beta\dot{I}_m \tag{9.9}$$

However as $\alpha \to 0$, $\sigma \to \infty$, so that $\dot{P}_m$ similarly tends to infinity. If actual productivity growth falls short of $\dot{P}_m$, then as $\dot{N}_m \to 0$, $\dot{Y}_m$ will also tend to zero.[3]

A simple numerical example can illustrate the magnitudes involved. Assume a transfer of employment from the market to the non-market sector, no increase in market sector investment ($\dot{I}_m = 0$), and that the balance of payment remains in equilibrium ($\delta B = 0$). Letting $\alpha = 0.5$ and $\gamma = 0.4$, substitution into (9.7) gives

$$\dot{P}_m = (\gamma - \frac{\gamma}{\alpha}(\alpha - 1)\dot{G}_m = 0.85\dot{G}_m \qquad (9.10)$$

so that for each 1% rise in non-market employment, a 0.85% rise in productivity in the market sector is required if all other magnitudes are to remain constant. Given zero investment growth and no overall increase in demand for marketed outputs it would be surprising if such a productivity increase was consistently achieved.

The effect of growth in the non-market sector in excess of that of marketed output must therefore be to reduce the share of other components of demand. Dividing the identity (3.4) by Y_m gives,

$$c_m + i_m + g_m + b_m = 1 \qquad (9.11)$$

where lower case letters stand for their respective upper case ratios. Clearly if the faster growth in G_m is not accompanied by a rise in productivity in the market sector sufficient for Y_m to grow commensurately with G_m, then g_m must rise. This in turn must affect the shares of market sector consumption and/or investment, and/or net exports. The decomposition in equation (9.11) is considered in Section 9.3 using Egyptian data for the years 1960 to 1976.

9.3 THE EGYPTIAN ECONOMY

It was shown in chapter 6 that a problem of structural imbalance has existed in the Egyptian economy for some time. In particular, an excessive growth in employment in service sectors, especially government services, between 1937 and 1960 has been emphasised by,

among others, Mead (1967).[4] The continuation of this trend during and since the 1960s suggests the likelihood of a rising value of g_m in equation (9.11).

Estimates of the relevant variables for the Egyptian economy between 1960 and 1976 are given in Table 9.1, with movements in the four variables shown in Figure 9.1. Before considering the data, some explanation of the calculation of the variables is necessary. In the absence of full published national accounts for Egypt, G_m has been estimated from a sectoral breakdown of public expenditure (which, in Egypt, includes many market sector activities). This includes spending on wages, direct purchases of market sector goods and services, transfers and debt service. Ideally saving out of wages should be excluded from G_m. However unfortunately published statistics do not provide a sectoral breakdown of public expenditure between wages and non-wage payments which prevents even the application of an average savings propensity to the data.

I_m is Gross Fixed Investment by the market sector. To assess the economic implications of changes in investment it would be preferable to use net investment. However, again, separate data on capital consumption are not available. Changes in stocks have also been omitted from Table 9.1 because data are only available for years after 1965, which means that, in effect, they are absorbed into C_m which is calculated as a residual. Separate inclusion of stock changes after 1965 would therefore have exaggerated any downward trend in c_m from 1960 (stock changes were positive in all years but one, during 1965-76) so that it was considered preferable to use slightly inflated but consistent figures for C_m. There is, of course, an opposite effect on C_m over the whole period as a result of the inclusion in G_m of the non-consumed part of non-market sector wages.

TABLE 9.1 THE ALLOCATION OF MARKETED OUTPUT BETWEEN SECTORS, 1960-76

Year	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Y_m (L.E. millions)	1052.7	1105.8	1156.3	1280.1	1415.9	1580.5	1684.1	1730.3	1665.1	1796.8	1979.2	2125.2	2270.3	2565.8	3084.1	3633.5	4375.4
g_m (%)	30.5	34.2	34.3	33.5	38.6	38.3	41.1	39.0	37.9	39.0	45.6	42.9	48.7	36.6	29.8	36.5	42.6
c_m (%)	57.2	50.1	53.0	58.8	45.7	47.4	42.6	46.4	51.9	49.3	45.7	50.6	44.6	55.2	68.2	57.9	40.4
i_m (%)	15.1	19.2	20.1	21.7	24.4	21.7	21.8	20.4	17.2	18.3	17.1	16.2	15.6	16.9	19.3	32.3	29.3
b_m (%)	-2.8	-3.5	-7.4	-14.0	-8.7	-7.4	-5.5	-5.8	-7.0	-6.6	-8.4	-9.7	-8.9	-8.7	-17.3	-26.7	-12.3

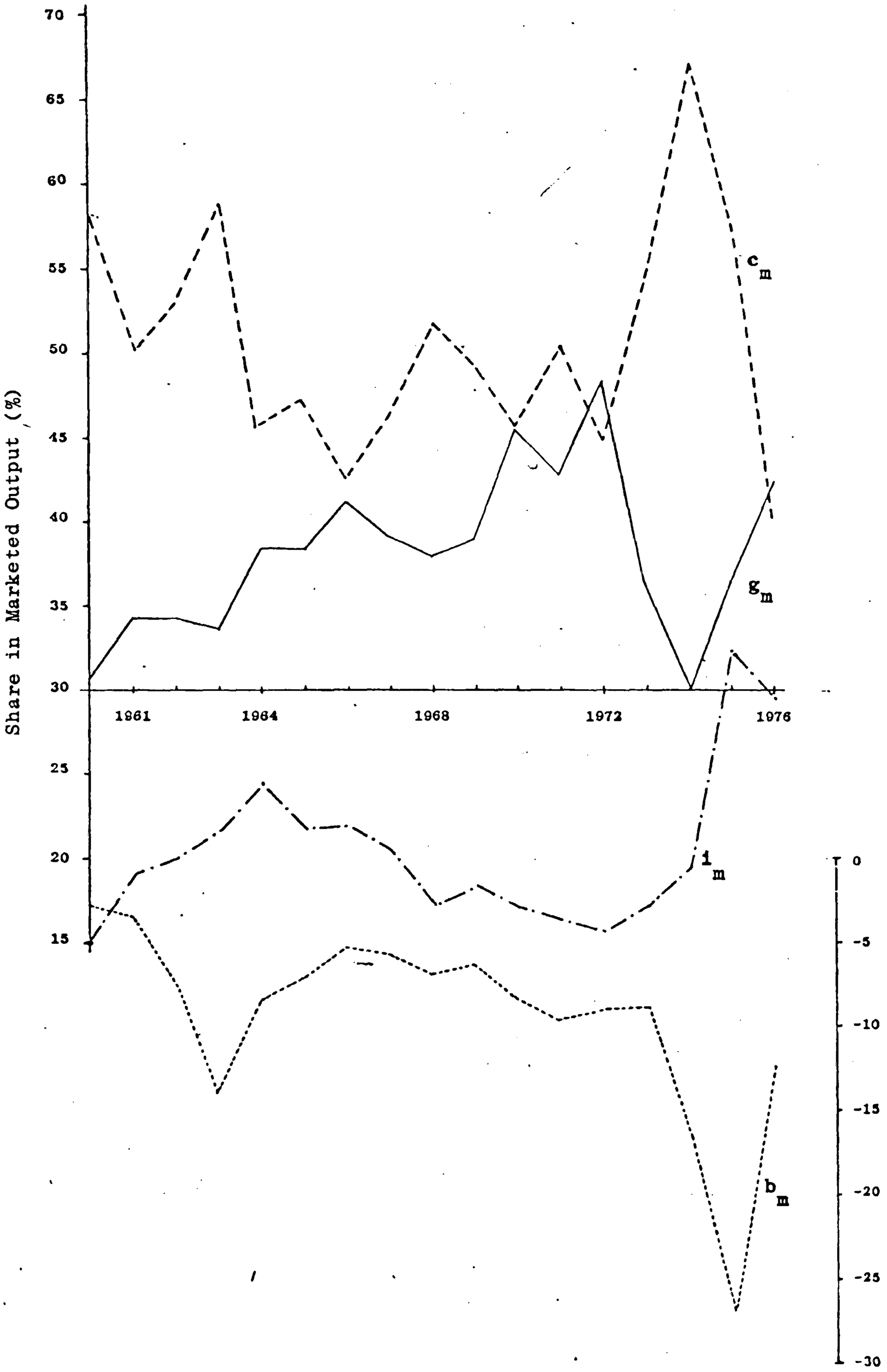
Notes: In the absence of a market/non-market classification in national account statistics Y_m has been calculated as total GDP less GDP in 'Social Development Services' (S.D.S.) or 'Other Services'. Included in S.D.S. are Education, Health, Social and Religious Services, Security and Justice, Cultural and Recreational Services, Government Administration, and Personal Services. Some of these services are undoubtedly marketed. It is however difficult to know how many, and provided the share of such services in total S.D.S. remains fairly constant there will be little effect on any trend in Y_m.

I_m is calculated as Gross Domestic Investment less Gross Domestic Investment in S.D.S. The demands of the non-market sector on marketed output (G_m) have been estimated using data on government expenditure on non-market services from the Administration Budget current and capital accounts (1960-76). With B simply the balance of payments current account surplus, this enables i_m, g_m and b_m to be estimated and hence c_m. Years up to 1971 relate to fiscal years (March to February).

Source: C.A.P.M.S., Statistical Yearbook of the U.A.R., Cairo. Various issues, and Arab Republic of Egypt, Economic Management in a Period of Transition, World Bank, 1978.

FIGURE 9.1

THE ALLOCATION OF MARKETED OUTPUT
BETWEEN SECTORS 1960-76



Finally G_m, I_m and B are necessarily at market prices whereas data on Y_m can only be obtained at factor costs. It would be preferable to have all values at factor costs to avoid inaccuracies arising from changes in the average indirect tax rate. Unfortunately, this information is not available so that a further source of underestimation of C_m is created which will be increasing if the average indirect tax rate is increasing.

Doubtless, application of alternative assumptions to the data calculations would yield different values for the four variables. However the figures in Table 9.1 are not intended to establish absolute values for the sector shares but rather to show changes in the variables over the period. Calculation of c_m, for example, excluding stock change effects after 1965, does not significantly alter the overall picture in Figure 9.1.

Considering the changes in the sector shares in Figure 9.1, it can be seen firstly, that changes in g_m are primarily reflected in inverse movements in c_m. Secondly, it is clear that there is an upward trend in g_m between 1960 and 1972, followed by a sudden fall and subsequent rise to 1976.[5] From 1965 to 1972 c_m tends to be less restricted by changes in g_m as a gradual decline in the share of market sector investment allows market sector consumption a higher share. Thus, for example, between 1966 and 1968 a decline in i_m in conjunction with a reduced value of g_m, allows a large rise in market sector consumption. Finally, the value of b_m (which is negative throughout the period) falls most sharply when c_m and i_m rise simultaneously.

To understand cause and effect between these ratios it is of course necessary to establish which ratio (or ratios) is the prime mover. In their study of the U.K. Bacon and Eltis consider

the allocation of the proportion of marketed output consumed outside the market sector ($\frac{Y_m - C_m}{Y_m} = e_m$) between g_m, i_m and b_m. However this does not imply that market sector workers take their share of Y_m first and the remainder is available for government, investment and exports. Indeed it is possible that changes in e_m may be affected by changes in g_m via its effects on market sector consumption.

In the context of the Egyptian economy it can be argued that g_m and to some extent i_m are the prime movers. Just as most macro models consider government expenditure as exogenous, so changes in g_m result from exogenous fiscal policy decisions rather than from changes in the other endogenous variables. This is particularly apparent when increased government expenditure is financed by increases in taxation with the result that personal consumption falls. Causation in this case obviously runs from government expenditure to personal consumption and not vice versa. In a traditional Keynesian 'demand-deficient' economy government expenditure may rise in response to stagnant personal consumption and investment. But this is not relevant in the context of a growing economy, with high rates of population growth and inflation. Investment in the market sector is to some extent subject to the same exogenous factors in Egypt as government expenditure. Much investment is carried out by public sector firms as an integral part of government development planning. Thus the rise in i_m in the early 1960s and subsequent gradual decline to 1972 reflects the movements of fiscal allocation of market sector investment funds - the intensive development effort of Egypt's First Five-Year Plan (1960-5) and the effective planlessness of the following seven years.[6]

Figure 9.1 reveals how drastic was the effect on c_m of the rise in the share of government non-market expenditures between 1960 and 1966, c_m falling from 57% in 1960 to 42% in 1966. Only during 1961-3 was there any significant increase in c_m when a faster rate of growth of marketed output kept g_m fairly constant and allowed market sector consumption to expand. This took place at the expense of the balance of payments as imports rose without a compensating rise in exports. It would seem that tighter import controls after 1963 meant that when g_m continued to rise, market sector consumption and investment could no longer maintain their previous levels by absorbing imports.[7] Thus real consumption by the market sector increased negligibly during the period and must have fallen considerably in per capita terms. It is not surprising then that government attempts to restrict consumption to provide investment funds failed, since market sector consumption was already under pressure from an unchecked growth in the non-market sector. Had this non-market expansion been restricted a larger share of domestic output could have been devoted to investment.

After a reduction in g_m and i_m between 1966 and 1968 due to the war, which enabled c_m to rise, g_m continued its upward trend to 1972. This again curtailed market sector consumption though less so than during 1960-6 because of a decline in i_m and a slight fall in b_m. Mabro and Radwan suggest that import controls were eased after 1967 and this may have helped to reduce the fall in c_m as imports increasingly supplemented domestic goods and services.[8]

From 1972-4 a sharp fall in g_m together with a greater liberalisation of import contols in 1973, allowed a rapid rise in c_m, which was however reversed from 1974 when post-war reconstruction and rearmament raised i_m and g_m.

Some interesting conclusions emerge from this analysis. Firstly, the growth in the claims on marketed output by the non-market sector over the 1960-76 period as a whole is undeniable, with the result that it became increasingly difficult for the market sector to supply the needs of the rest of the economy. As Table 9.2 below shows, the per capita marketed output available for consumption by the market sector rose in real terms by a mere 0.2% per annum. Real wages in the market sector did of course rise, so that effective demand was greater than available supply. This caused inflation and the shortages of consumer goods which have been common in Egypt in recent years. What seems most likely is that those employed in the market sector who could most easily achieve wage rises maintained and even increased their consumption levels while the lower classes, with less job security and poorer bargaining positions, actually suffered reductions in their consumption.[9] The pressure on these groups has obviously varied but was probably greatest during the First Five-Year Plan, when c_m fell most sharply. Indeed in 1967 an Economic Intelligence Unit Report commented,

> "Pressure on the fixed income groups that constitute the bulk of the urban populace (about 40% of the country's population) must be becoming intolerable".[10]

It is important to stress that this does not suggest that a rise in government spending on activities such as health or education is necessarily wrong or wasteful. These activities contribute greatly to the development effort in the long-run, but if they are allowed <u>in the short-run</u> to grow faster than the rate of growth of marketed output the result must be a reduction in the share available to other sectors. As Bacon and Eltis have pointed out, if investment and the balance of payments are not to

TABLE 9.2 THE GROWTH OF REAL CONSUMPTION IN THE MARKET SECTOR

1960-76

	1960	1976	Average Annual Compound Rate of Change
(i) Marketed Output (at constant 1960 prices) (Y_m)	1052.7	2165.0	4.4
(ii) Market Sector Consumption (C_m)	602.1	874.7	2.4
(iii) Population dependent on the Market Sector (000s)*	21233	29728	2.0
(iv) Per Capita Market Sector Consumption [(ii) ÷ (iii)]	28.36	29.42	0.2

* Estimated as Total Population x $\frac{\text{Market Sector Employment}}{\text{Total Employment}}$

Source: Table 9.1 and C.A.P.M.S., Statistical Yearbook of the UAR, Cairo. Various issues.

suffer, an increase in g_m must be accompanied by a similar decline in c_m. This need not mean a reduction in the standard of living of market sector workers if that sector can achieve a satisfactory rate of output growth.[11] In Egypt however this has meant a negligible increase in living standards. As Figure 9.1 shows, over the period as a whole the fall in c_m largely compensated for the growth in g_m, though its failure to do so during the late 'sixties and early 'seventies resulted in investment in the market sector suffering and a steadily worsening balance of payments. The suggestion here is that it is the projected growth of marketed output which is crucial when deciding the allowable magnitude of non-market sector growth. Given the failure of Egyptian planners to achieve a faster rate of growth in Y_m (for whatever reasons), they could only achieve the realised increase in G_m by allowing adverse effects on other sectors. The rise in the balance of payments deficit, the squeezing of market sector investment and the restriction of many market sector workers' living standards must therefore be blamed partly on this expansion.

It is however the effects of changes in these variables on prices and output growth (via effects on employment and productivity) which are likely to be most serious for any economy and in Egypt closer examination reveals that both have been adversely affected by the increasing share of marketed output absorbed by the non-market sector.

9.4 OUTPUT, EMPLOYMENT AND PRODUCTIVITY

Normally an increase in g_m relative to c_m such as Egypt experienced between 1960 and 1976 would be expected to be accompanied by a shift in employment from the market to the

non-market sector. When this occurs, as seen in Section 9.2, it raises the required rate of productivity growth if living standards are to grow equally across different sectors of workers. Although the enumeration of the labour force in Egypt carries little assurance of accuracy (particularly its sectoral divisions[12]), some idea of changes in employment may be obtained using similar definitions to those used to estimate market sector output. Table 9.3 presents two estimates of market and non-market sector employment growth. The first set of estimates (1) covers the period 1960-76 and assumes the non-market sector to be equivalent to the 'Social Development Services' sector. A second set of estimates (2) is presented for 1960-5, providing more accurate estimates of the market and non-market sectors, from a breakdown of data available only for those years.

As expected in a developing country, both market and non-market sectors are experiencing increases in employment. Using definition (1) in Table 9.3, non-market sector employment is estimated to be growing at about 1½% faster than that of the market sector. Comparing this with the estimate for 1960-5 using definition (2) suggests that definition (1) may put a downward bias on non-market sector employment growth for the whole 1960-76 period since it clearly does so for the first five years. However in the absence of more accurate data for later years this cannot be confirmed.

It was shown in Section 9.2 that, in the context of a constant total labour force, a transfer of resources from the market to the non-market sector will reduce the growth of marketed output unless productivity in the market sector can rise substantially. Table 9.3 indicates that in Egypt both market and non-market sectors have

TABLE 9.3 EMPLOYMENT IN THE MARKET AND NON-MARKET SECTORS

1960-76

		Employment (in thousands)			Average Annual Rates of Growth (%)	
		1960	1965	1976	1960-76	1960-5
Market Sector	(1)	4939.2	6067.4	7556.3	2.7	4.2
Non-Market Sector	(1)	1066.8	1306.5	2071.9	4.2	4.2
Market Sector*	(2)	5546.2	6668.4	n.a.	n.a.	3.8
Non-Market Sector†	(2)	459.8	705.5	n.a.	n.a.	8.9

n.a. = not available

* Defined as employment in Agriculture, Industry, Construction and Electricity, Public Utilities, Housing, Transport and Communications, Finance and Trade, Personal Services, and privately-owned Health, Education, Social, Cultural and Security Services.

† Defined as employment in publicly-owned Education, Health, Social, Cultural and Security Services, and Government Administration.

Source: M. Hanafi and M. Mongi, Labour absorption in the Egyptian Economy, Institute of National Planning, Cairo, and C.A.P.M.S., Statistical Yearbook of the U.A.R., Cairo, various issues.

experienced increases in employment such that a relative transfer of labour from the market to the non-market sector has occurred. The extent to which this has reduced $\dot{Y}_m$ can be gauged by considering the possible effects of reducing the growth in G_m so that it increases commensurately with C_m and comparing this with Egypt's actual experience over the period. Results are shown in Table 9.4.

On the assumption that this equalisation of G_m and C_m would likewise equalise employment growth rates across sectors, both market and non-market employment would now grow at 3% per annum.[13] If the standard of living of market sector workers is assumed to rise by 5% over the period (that is, at 0.3% per annum) instead of the actual fall of 5%, this will lead to a growth in C_m and G_m of 3.3% per annum. Thus by 1976, C_m and G_m could have risen to a total of L.E. 1552.4 million instead of L.E. 1797.0 million. Allowing the net reduction of L.E. 244.6 million in C_m and G_m to be allocated to market sector investment, this might be expected to raise productivity. This relationship has been examined for Egypt using data on market sector productivity growth ($\dot{PR}_m$) and investment growth ($\dot{I}_m$) for the 1960-76 period. An ordinary least squares regression produced the following result:

$$\dot{PR}_m = 0.83 + 0.18\ \dot{I}_m \qquad (9.12)$$

$$(1.28)\ \ (6.88)$$

$R^2 = 0.78$; D.W. = 1.53; Figures in parenthesis are t-values.

The coefficient on $\dot{I}_m$ is highly significant suggesting that a 10% growth in investment could be expected to add about 2% to productivity growth. Thus, as Table 9.4 shows, the result of reallocating demand is to allow market sector investment to grow at over 11% per annum (instead of the previous 9%), producing a productivity rise of 2.8% per annum (instead of the 1.9% actually

TABLE 9.4 ACTUAL AND PROJECTED INCREASES IN MARKET SECTOR SUPPLY AND DEMANDS, 1960-76

(In Million Egyptian Pounds; at constant 1960 prices)				Average Annual Rates of Growth (%) 1960-76	
	1960	1976			
	Actual	Actual	Projected	Actual	Projected
Y_m	1052.7	2165.0	2593.9	4.6	5.8
C_m	602.1	874.7	1012.1	2.4	3.3
G_m	321.6	922.3	540.3	6.8	3.3
I_m	159.4	634.3	878.9	9.1	11.2
B	-29.8	-266.3	162.6	-14.7	12.4
	(in Thousands)				
N_g	1066.8	2071.9	1706.9	4.2	3.0
N_m	4939.2	7556.3	7921.3	2.7	3.0
PR_m	213.1	286.5	331.5	1.9	2.8

Source: Table 9.1 and C.A.P.M.S., Statistical Yearbook of the U.A.R., Cairo, (various issues).

achieved). Together with the 3% rise in employment this would increase Y_m at an annual rate of 5.8% - more than 1% above the rate achieved during 1960-76.

The beneficial results of such a policy are clear. The reduced growth in the standard of living of non-market sector employees to 0.3% per annum would allow a similar rise in the standard of living of the numerically much larger category of market sector employees who have actually suffered a fall in their real consumption.[14] The balance of payments is also able to move into comfortable surplus. Alternatively fewer exports could have been sacrificed for higher domestic consumption growth.

9.5 EFFECTS ON INFLATION

In addition to reducing output growth, the increasing demands on marketed output by those not directly concerned in its current supply will put upward pressure on prices. If productivity increases fail to maintain supply sufficient to meet demand this must be accomplished by increases in the price of marketed outputs. Johnston suggests that

> "a given percentage excess demand (supply) in the current period leads to an equal percentage rise (fall) in price in the forthcoming period."[15]

Thus $$\frac{p_{t+1}}{p_t} = \frac{E_t}{p_t q_t} \qquad (9.13)$$

where p and q are the price and quantity of marketed output respectively and E is the level of excess demand (supply). Allowing for the many exogenous factors which influence p, such as rising import prices, an excess demand coefficient less than unity is more likely.

Thus $\frac{p_{t+1}}{p_t} = a\frac{E_t}{p_t q_t}$ where $0 < a < 1$ (9.14)

The question then arises - how is excess demand measured? There are of course numerous problems associated with the measurement of excess demand and particularly in a less developed economy. The unemployment rate, frequently used to measure excess demand in developed countries, is a largely meaningless statistic in most less developed countries and hence of little use for our purpose. It has been shown however that excess demand will arise as a result of a growth in demand by the market and non-market sectors for marketed output in excess of its supply. Thus a partial indicator of this structurally-caused excess demand will be the market sector consumption ratio c_m. As the amount of goods and services available to market sector employees is squeezed (either due to increasing government purchases, investment or exports) then, without a similar cut in wages, the result must be increased competition for available supplies, and thereby rises in prices. Prices may also be bid up indirectly as market sector employees, faced with a decline in the growth of their living standards, seek larger money wage rises which are then passed on in price increases.

Changes in the rate of growth of marketed output may also reflect changes in the pressure of demand. If in the absence of fluctuations in demand, supply grows at a constant rate, then deviations in output from this trend rate of growth may be seen as a measure of the influence of demand to raise or lower output growth. Unless supply is infinitely elastic with respect to changes in demand, a growth in demand above the trend rate of output growth will be associated with rises in prices. In fact in Egypt, as in many LDCs, there are several factors which tend to make supply

inelastic. The foreign exchange shortages associated with balance of payments deficits and import controls have resulted in shortages of imported input goods causing supply bottlenecks of varying degrees of severity throughout the 'sixties and 'seventies. Shortages of particular types of labour, despite widespread underemployment and a slow growth in agricultural productivity, have similarly reduced the capacity of the economy as a whole to grow commensurately with demand.[16]

The influence of these two demand variables on prices has been tested for the period 1961-76. A negative sign is to be expected on the coefficient of c_m as a falling market sector consumption ratio puts upward pressure on prices and vice versa. Conversely, a positive relationship is predicted between fluctuations in demand for marketed output and price changes. Performing an ordinary least squares regression gives the predicted signs and significant coefficients on the relevant variables. Results are shown in equation (9.15).

$$\dot{p} = 15.11 - 0.26\ c_m + 0.49\ \dot{O}^{-1}_m + 9.05\ D \qquad (9.15)$$

$$(3.69)\quad (3.09)\qquad (5.42)\qquad (4.00)$$

$R^2 = 0.81$; D.W. = 1.20. Figures in parenthesis are t-values.

$\dot{p}$ is the annual percentage change in wholesale prices,[17] c_m is as previously defined, and $\dot{O}^{-1}_m$ is the deviation of annual growth rates in marketed output from a constant trend rate of growth, lagged one period.[18] D is a dummy variable for the 1973 war which created a large, exogenous influence on prices. (1973 takes a value of unity; all other years, zero).

Both variables are significant and suggest that, on average, a 4 percentage point fall in c_m or a 2 percentage point rise in

$\dot{O}_m^{-1}$ will produce a 1 percentage point rise in the rate of inflation. The important point as far as a marketed/non-marketed analysis is concerned is that if the non-market sector expands at the expense of market sector consumption it is likely to add an upward impetus to prices. Indeed in Egypt's case it is clear that the fall in c_m, particularly during the mid-sixties and mid-seventies, is partly to blame for the simultaneous surges in inflation.[19]

9.6 COMPOSITION OF THE NON-MARKET SECTOR

These results inevitably lead to the question: could the rise in g_m have been avoided? The answer would seem to be that <u>in part</u> it could. The rates of growth of the various components of government non-market expenditure for the years when g_m increased most rapidly are shown in Table 9.5. Defence expenditure represented both the largest share and fastest growing of non-market expenditures and given the existing military situation during this time it would be unrealistic to expect any reduction in this item. However, it is also true that other areas of expenditure grew far in excess of marketed output growth. General Public Services grew particularly rapidly between 1960-6 (exceeding even defence expenditure increases), and 1974-6. The other main expenditure categories - Education and Non-Market Investment - also persistently exceeded marketed output growth (except 1960-6 in the case of Investment). Indeed the only category which regularly grew more slowly than marketed output was Local Authority Expenditure. It is not suggested here that these expenditures were unnecessarily high or wasteful in themselves; no doubt they involved many important and valuable projects. However it is also the case that with the relatively low rates of

TABLE 9.5 GROWTH OF NON-MARKET EXPENDITURES 1960-76

	Share of total Expenditure in 1960	(at constant 1960 prices) Average Annual Rates of Growth (%) 1960-76	1960-6	1968-72	1974-6
Current Expenditures:					
General Public Services	21.8	5.0	19.2	0.9	22.0
Defence	23.7	7.0	17.5	5.7	13.4
Including Emergency Fund	-	10.5	-	22.0	38.7
Education	13.9	6.4	9.4	6.9	12.8
Health	2.7	10.1	15.0	15.4	-8.3
Community & Social	1.0	10.1	22.3	-15.9	150
Local Government	11.2	2.6	-2.0	0.7	24.3
Investment Expenditures	18.7	6.8	-2.6	13.0	77
Total	100	6.8	10.6	12.8	32.0
Marketed Output	-	4.6	5.1	5.8	9.0

Source: Arab Republic of Egypt, Economic Management in a Period of Transition, May 1978, vol. 6, World Bank.

marketed output growth achieved, these expenditures took place with the consequences for the rest of the economy which have already been identified. Thus a marketed/non-marketed distinction seeks only to highlight the alternatives open to planners and policy-makers. The expansion of education facilities for example has been a laudable goal of Egyptian planners, but the increased short-term demands which it makes on marketed output and the high levels of disguised unemployment among Egypt's educated may make a stronger case for channelling some of that expenditure into sectors which raise current supplies of marketed output. Similarly the growth in expenditure on government services which allows high graduate underemployment in Public Administration could almost certainly benefit the economy more if it was used in the market sector.

9.7 SUMMARY AND CONCLUSIONS

This chapterhas attempted to show some of the consequences of changes in the composition of demand for market sector goods and services. In Section 9.2 it was shown that increases in the relative size of the non-market sector raise the required rate of productivity growth if marketed output is not to be retarded and inflationary pressures avoided. Section 9.3 investigated the effects of growing public expenditure on non-marketed outputs in the Egyptian economy since 1960 and it was suggested that this was at least partly to blame for a worsening balance of payments, reductions in market sector consumption and insufficient market sector investment over the period. Furthermore, it was shown in Sections 9.4 and 9.5 that this expansion of the non-market sector has reduced output growth and added to inflationary pressures. Disaggregating non-market expenditures in Section 9.6 indicated that

increasing defence expenditure, the item usually blamed for the rising government budget deficit, did indeed contribute substantially to the relative growth of the non-market sector. However most other expenditures grew in excess of marketed output, of which the most significant were education and government administration expenditures.

The effects of non-market sector growth considered in this chapterare short-run; no predictions are made for the long-run. The history of growth in many developed countries is of a rising contribution of such non-marketed outputs as education and health facilities, and many would argue that they are an important source of rises in productivity throughout an economy. If however the non-market sector grows rapidly in the short-term its demands on marketed outputs are likely to exceed greatly its contribution to their supply. This has been the case in Egypt, at least during 1960-76. If the resulting problems are to be avoided in the future, Egyptian planners must initially attempt to equalise the rates of growth of G_m and Y_m until a sufficiently high rate of growth of marketed output can be achieved to allow an increasing share to be purchased by the non-market sector without this putting excessive pressure on other sectors. If instead present trends are allowed to continue the outcome must be slower growth than would otherwise occur, increasing foreign indebtedness, greater social unrest and further inflationary pressures.

Footnotes

1. c.f. J. Johnston (1975, p. 289).

2. The required productivity increase will also be influenced by the way in which the market to non-market transfer is financed. Taxation financed expenditure for example can be expected to produce different effects on demand from expenditure financed by government borrowing from the bank or non-bank sectors.

3. This result is similar to that obtained by Baumol (1967). In his model, Baumol assumes labour transfer from a 'progressive' to a 'non-progressive' sector occurs as a consequence of differential rates of productivity growth between the sectors. In this model however it is the rate of productivity growth necessary to maintain output at constant prices, given a labour transfer, which is being sought.

4. See D. C. Mead (1967, pp. 131-155).

5. Notice that the full extent of the rise in non-market demands on market sector outputs cannot be seen in an increasing share of the non-market sector in total GDP since non-market sector GDP (estimated from wages and salaries in that sector) is only one part of the non-market sector's demands on Y_m.

6. Disagreement and indecision towards the end of the First Five-Year Plan concerning the form and content of the new plan meant the late introduction in 1966 of a plan to run to 1972. As far as investment was concerned this involved little more than the completion of projects begun during 1960-5. In practice however the period 1965-72 lacked any consistent or comprehensive planning with annual draft plans rarely being fully applied, due in part to the 1967 war with Israel. A ten-year plan was announced in 1972.

7. See Mabro and Radwan (1967, p. 72).

8. ibid. pp. 73-4.

9. Although officially wages and prices rise by government decrees, in practice actual wage rises achieved may depend on the type of work and the degree of power or influence particular groups of workers have.

10. Economic Intelligence Unit, Quarterly Economic Review, March 1967, 7.

11. A rise in the ratio of household saving to personal disposable income in the U.K. and Greece has been put forward by Bacon and Karayinnis-Bacon as one explanation of a falling value of c_m in both countries. It is difficult to establish if this has been important in Egypt, since data is not available on household saving, but a crude ratio of total saving to total disposable income shows no tendency to rise when c_m is falling. Only if household saving increased significantly at the expense of corporate saving, would such an explanation be plausible in this case.

12. There are, for example, at least four different estimates of employment in manufacturing industry in 1960. See Mabro and Radwan (1976, p. 139).

13. This is the weighted average of actual rates achieved using definition (1) in Table 3, namely 4.2% for non-market employment and 2.7% for market sector employment. Since total demand is not reduced, there is no reason to believe that the overall rate of employment growth will fall.

14. While the share of marketed output available to market sector employees grew by only 2.4% annually, employment grew at 2.7% per annum, 1960-76.

15. J. Johnston (1975, p. 292).

16. Perhaps the strongest evidence for this is the rise in the economy's balance of payments deficit. Net imports increased from -0.2% of GDP in 1960 to 16.4% in 1976.

17. The composition of the wholesale price index in Egypt is considered, by some commentators, to be a more accurate calculation of how prices actually change than the 'cost of living' index, and has therefore been preferred here. See M. M. El Kammash (1968), pp. 154 ff.

18. The constant trend value of marketed output growth is found by solving

$$Y_m^t = Y_m^O (1 + r)^t \text{ for } r, \ (t = 1 \ . \ . \ . \ 16)$$

to give $r = c^{\beta} - 1$ where $\beta = \ln (1 + r)$

19. The c_m ratio fell by 16 percentage points 1963-6 and 28 percentage points 1974-6, while the inflation rate rose from 1.1% to 7.4% and 7.5% to 12.4% over the same periods.

CHAPTER 10

THE DEVELOPMENT OF TAX REVENUES

10.1 INTRODUCTION

In Parts 1 and 2 it was argued that structural changes in many countries in recent years have involved a relative growth in service sectors. The public sector has shared in this growth with consequent rapid increases in government expenditure on its non-marketed activities. Given the importance of taxation in funding such expenditure increases chapters 4 and 5 sought to provide a method of modelling tax revenue growth which could identify the path of tax revenues as incomes increase. The model presented was based on the U.K. tax system though it was argued that most of its components could be adapted to other tax systems in use.

For Egypt, the evidence of the previous chapters in Part 3 indicated that the country has experienced particularly rapid structural change towards services and especially government non-marketed services in recent years. It is therefore of interest to examine in Egypt's case how tax revenues have grown during this process and how they can be expected to grow in the future. Unfortunately insufficiently detailed information is presently available on the composition and structure of the Egyptian tax system to allow construction of a model for Egypt similar to that used in Part 2. However for analytical purposes there are similarities between the U.K. and Egyptian tax systems which allow the tax model in Part 2 to be used to shed some light on the growth of Egyptian tax revenues.

Before considering the revenue flexibility of the Egyptian tax system in Section 10.3, it is necessary to describe the relevant features of the tax system. Section 10.2 therefore outlines the main features of the tax structure (10.2.1), and examines some

evidence of revenue growth since 1960 (10.2.2). The chapter is summarised and some conclusions drawn in Section 10.4.

10.2 THE EGYPTIAN TAX SYSTEM

10.2.1 The Tax Structure

Detailed information on the tax system in Egypt is difficult to obtain. Data on the structure of individual taxes, changes in rates, thresholds and exemptions are not regularly published. Fortunately however the main components of the tax system and their operation have not changed significantly since the early studies of Hansen and Marzouk (1965) and Lotz (1966).[1] The main changes since these studies have been the introduction in 1965 of an indirect tax system of 'price differences' for some commodities and a 1976 State draft plan to restructure the tax system (including a 'general' sales tax)[2] but this has not yet been implemented. In this section the main features of the present tax system will be outlined.[3]

The Egyptian system of taxation is essentially composed of personal income and wealth taxation, corporate taxation, social insurance taxation, commodity taxes and subsidies and various othe minor taxes including an inheritance tax and stamp duties. Although these types of taxes are common to many systems, in Egypt their operation is relatively complicated.

Income Taxation

The personal income tax system uses a number of specific taxes the base for which varies according to the income source. Thus there are separate taxes for income from land rent, business profits, wages and salaries, daily-paid wages and income from non-commerical

professional activities. While most earned incomes are subject to progressive tax rates, unearned incomes (interest, dividends etc.) tend to be taxed regressively, However in addition to these specific taxes, incomes from all sources are subject to a 'General Income Tax' which is steeply progressive. A more detailed description of these taxes is given in Appendix 10.1 which gives some indication of variations in exemptions and rate structure across taxes. The system was further complicated with the introduction in 1960 of a 'Defence Tax' which applies to all income sources except daily-paid wages. This tax was introduced at a flat rate of 7% for all incomes except wages and salaries for which rates ranged from 1-4%. Rates have been changed at various times since then. Figure 10.1 shows the rate progression of wages and salaries, and professional income taxation, and the general income tax schedule. These are the main taxes affecting personal disposable income, apart from the defense tax which, in general, shifts each schedule upwards uniformly.[4]

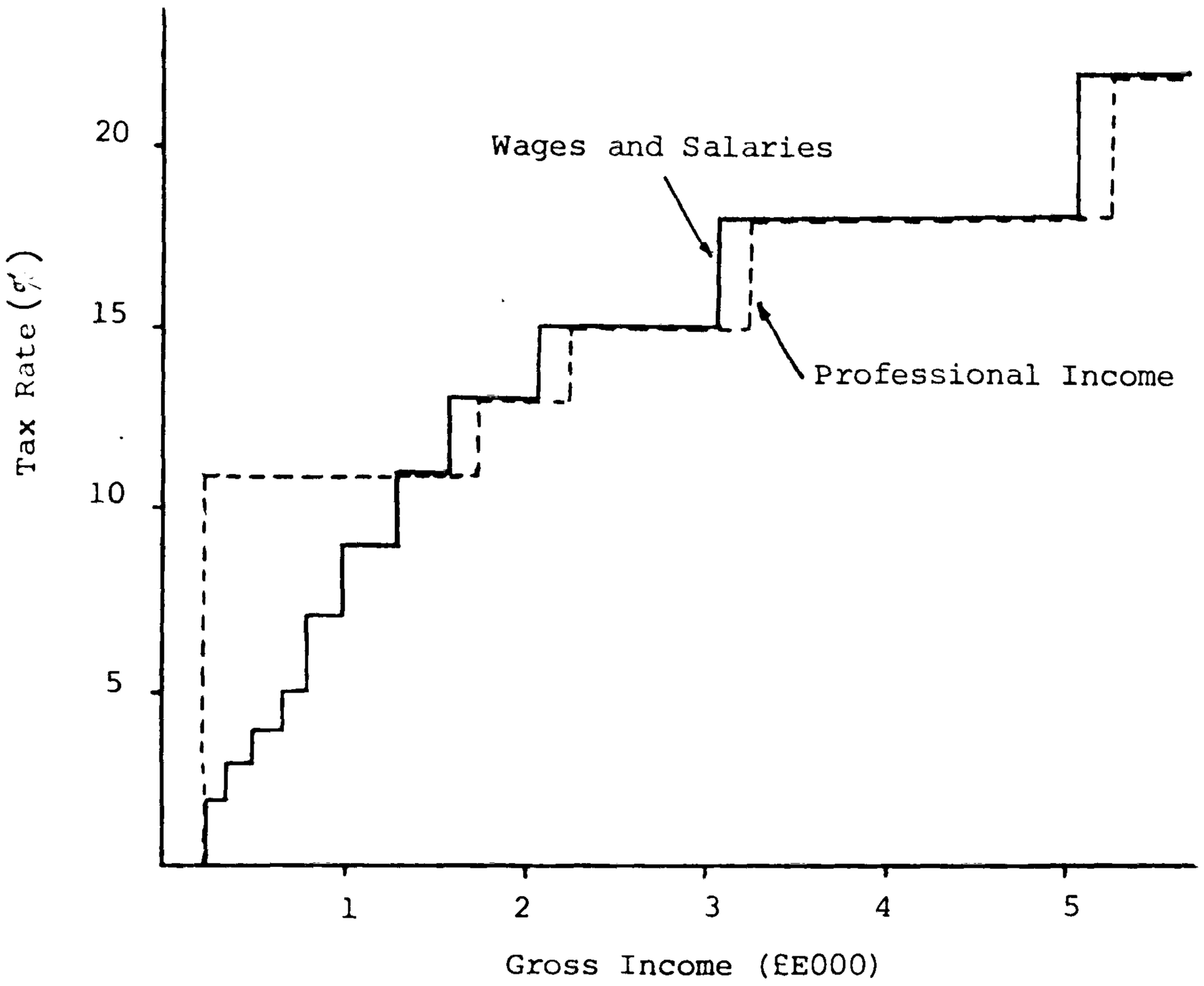
It can also be seen in Figure 10.1 that the rate structure of the general income tax (GIT), at least for incomes below £E 10,000, is similar to the specific personal income taxes, rising from 8% to 25%. Although tax rates rise steeply for incomes above £10,000 this section is of little relevance in practice since there are negligible numbers of income earners in this range, (see Section 10.3.1). In fact since the tax base for the GIT is gross income less all specific taxes and a £E 1500 tax threshold operates, lower income earners pay no general taxation. Indeed, because of high levels of income tax allowances relative to average incomes the majority of earners pay little or no income tax at all.[5]

Social Insurance Tax

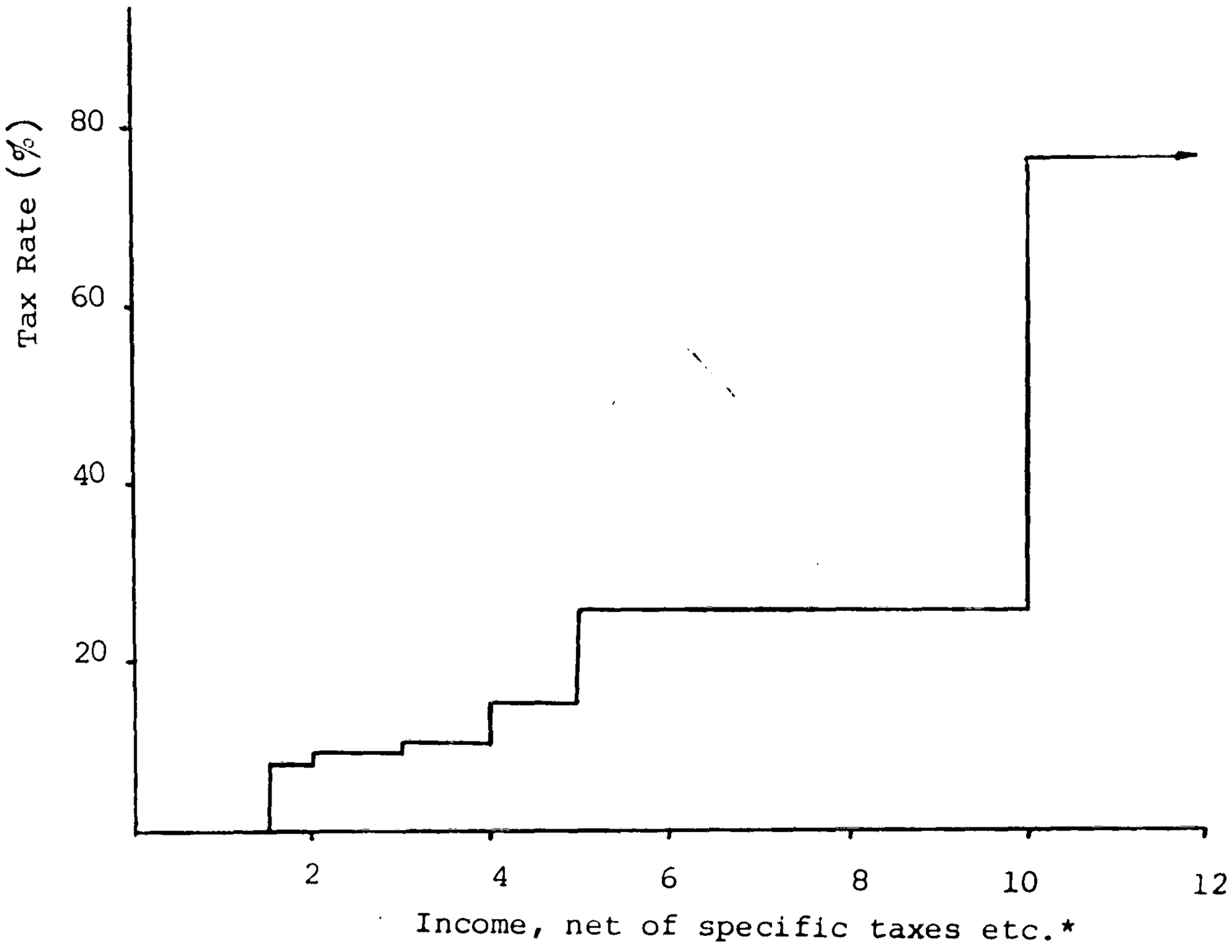
A social insurance tax has operated in Egypt since the mid 1950s.

FIGURE 10.1 STRUCTURE OF SPECIFIC AND GENERAL INCOME TAXES

Specific Income Taxes



General Income Tax



*See Appendix 10.1

Separate schemes were introduced for government and non-government employees. In each scheme, both employer and employee pay contributions. When the schemes were introduced, in the public sector employee contributions were 10% of earnings and the government also contributed 10%.[6] In the private sector contributions of 5% were each paid by employee and employer. By 1966 extensions of the private sector scheme led to increased contributions of 10% for employees and 23% for employers. Those outside these two schemes could still benefit from a non-contributory pension scheme set up in 1950. This scheme included old-age, disability and orphan pensions.[7] An important difference between the Egyptian and U.K. social insurance schemes is that, unlike the U.K., social insurance contributions in Egypt are tax allowable in specific and general income tax assessment.

The coverage of the Egyptian social insurance scheme is therefore wide by the standards of most less developed countries. The whole population is, at least in principle, covered by a pension scheme which though not guaranteeing subsistence is considered by Abdel-Fadil to be 'appreciable when compared with minimum wages', (Abdel-Fadil, (1980, p.117)). Though estimates vary, it would seem that about one quarter of the total labour force (or about half the non-agricultural labour force) were covered by the government's insurance schemes in 1964.[8] This proportion may well have risen subsequently. Similar data on the proportion of private sector employees covered by the sector's pension scheme are not available. By 1971 the number of participants in different social insurance schemes had risen to almost 3 million out of a total labour force of about 8.5 million.

The benefits which are received under the Egyptian social insurance scheme differ from the U.K. system, (approximated by the 'guaranteed minimum income' in chapter 5) in two important respects.

Firstly unlike the U.K. National Insurance, Egyptian social insurance schemes are intended to be self-financing. Therefore whereas in the U.K. National Insurance is more accurately to be seen as a supplementary income tax, in Egypt it is more obviously a compulsory savings scheme, where contributions made during employment are directly related to payments received in retirement, illness etc.

Secondly apart from the limited payments made under the non-contributory pension scheme discussed above, the amount of benefits received is generally conditional on the amount of contributions made.[9] Thus whereas in the U.K. the social security benefit level represents a minimum income (approximately) of all employed, unemployed, retired etc., in Egypt this applies only to insurance scheme participants. While most non-insured retired men can expect a state pension, non-insured unemployed and retired women are not covered. Similarly low-wage employees not in an insurance scheme can not expect disposable income to be 'topped-up' to a social security minimum as in the U.K.

Pensions which are paid under the social security legislation consist of a basic sum, allowances for dependants and a family bonus. Pensions from contributory schemes are based on the length of time insured and on average earnings at the end of employment.

Indirect Taxes

Indirect taxes take three main forms in Egypt: selective customs duties mainly on imports, various excise taxes on particular commodities and, since 1965, 'price differences' whereby the difference between officially-fixed ex-factory and wholesale prices of some commodities is paid to the government. Since the end of the 1950s when cotton export taxes were abolished, export taxes as a whole have not been important sources of revenue. Of the various import

duties levied, tobacco is by far the most important revenue source contributing about 50% of customs duty revenue, the main other sources of revenue being imported tea, coffee, motor cars and consumer durables. Effective tax rates on imports are however more widespread than import duties themselves. This is achieved through the system of specific excise or 'consumption' duties which are applied to a wide range of goods. As well as many domestic goods such as sugar and kerosene bearing excise duties, many luxury items, most of which are imported bear similar duties (e.g. artificial silk, alcohol, beer, wines and other spirits). Although excise taxes apply to many goods consumed particularly by low income earners, the simultaneous widespread use of subsidies on many of these 'low-wage' goods counteracts these so that effectively the major impact of excise taxes is on luxuries.[10]

Since their introduction in 1965, price differences have been applied to a wide range of commodities. Abdel-Fadil (1980) suggests that as much as 80% of price difference tax revenue in 1970 was raised from basic wage-goods (including tea, sugar, cigarettes, clothes, shoes, soap, margarine etc.), with only 4% from consumer durables (fridges, air-conditioning, T.V. sets, washing machines, cars etc.) and the remaining 16% from intermediate goods. Although these price differences are selective they affect goods which constitute about 70% of average family expenditure.[11] The rate of duty for customs and excise taxes and price differences is of course variable across commodities, but fairly typical examples would be the 33% excise duty on soft drinks (100% when produced from imported concentrates) and a price difference on plastonil shoes which in 1966 was equivalent to about 22% of the retail price.[12]

10.2.2. Tax Revenues

Having examined the composition of the Egyptian tax system this section presents evidence on the revenue raised by the various taxes discussed above during the period 1960-78. Data on the shares of different taxes in total tax revenue are presented in Table 10.1 and tax revenues as a percentage of GDP are given, in Table 10.2.[13]

It is often suggested that indirect taxes are a much more important revenue source than direct taxes in developing countries, which is in contrast to the situation in most developed countries. It can be seen in Table 10.1 that while this is true for Egypt, it occurs primarily because of the importance of international trade taxes. For most of the period considered these taxes accounted for between 45% and 55% of all tax revenue. Their share is reduced in the late 'sixties and early 'seventies partly because of the introduction of the price differences and partly because balance of payments improvements in this period reduced import duties. The return to shares of around 45% for trade taxes in the mid-'seventies reflects the balance of payments deficits in these years.

For domestic commodity taxes it is interesting to note that, except for a few years after 1968, revenue from these taxes was less than that from income and profit taxes. Goods and service taxes produced only 10% of tax revenue in 1960 and although this rose to around 30% with the introduction of price differences, by 1978 they accounted for only 18%. Income and Profit taxes on the other hand increased fairly steadily from 18% in 1960 to 29% in 1978. Within each of these categories however there are differences between taxes. Within the domestic commodity taxes, excise duties fluctuate in importance from as high as 18% in 1964 to only 7.6% in 1978. This is perhaps to be expected from taxes whose coverage and

TABLE 10.1 CENTRAL GOVERNMENT REVENUE, 1960-78

As % of Total Tax Revenue

	1960	1962	1964	1966	1968	1970	1972	1974	1976	1978
Income and Profit Taxes	17.9	17.7	17.4	26.0	21.8	24.9	25.0	25.7	26.0	29.0
Business	11.2	11.1	12.1	20.6	16.5	19.9	20.6	20.9	22.2	26.5
Personal	6.7	6.6	5.3	5.4	5.2	5.0	4.4	4.8	3.8	2.6
Property	11.3	3.3	4.1	2.7	2.8	3.6	4.1	3.1	1.5	1.1
Goods and Service Taxes	10.6	10.3	18.2	13.4	30.8	30.8	31.0	28.6	22.7	17.7
Excise	10.6	10.3	18.2	13.4	n.a.	8.2	11.7	11.5	7.8	7.6
Price Differentials	-	-	-	-	n.a.	22.6	19.3	17.1	14.5	10.1
International Trade Taxes	46.0	55.1	53.0	50.4	34.9	32.2	33.2	34.8	43.0	45.2
Stamp Duties and Other Taxes	14.2	13.6	7.2	7.5	9.8	7.5	6.6	8.6	6.8	6.9

degree are changed at discrete intervals. Price differences however exhibit a steady decline in their share of revenue from the first year a break down is available in 1970, to 1978. Despite this price differences are an important revenue source, providing almost a quarter of total tax revenue in 1970 and still producing more revenue than excise duties by 1978. Changes in price differences can also yield increased revenue in a less visible manner than excise duty changes. Within direct taxes it is clear from Table 10.1 that business and personal tax revenues have opposite trends. While the share of business income tax rises steadily from 11% in 1960 to 27% in 1978, personal income tax revenue falls from 6.7% to 2.6% over the same period.

Finally, property taxes, mainly building and land rents, have not been a significant revenue source since the early 'sixties, and declined particularly in the 'seventies. This has arisen because of nationalisation which affected much property income and because in many cases the tax base has remained fairly fixed in nominal terms.[14]

Before considering the ratios of taxes to GDP as shown in Table 10.1, it is important to stress that these ratios, frequently used to describe the 'flexibility' of various taxes, may not give meaningful representations of flexibility (and especially built-in flexibility). To assess the automatic revenue change of a particular tax consequent on a change in income it is important to use an income definition most appropriate to the tax in question. Thus for example the built-in flexibility of a personal income tax should be assessed with reference to personal incomes. If instead flexibility is assessed with reference to some aggregate income definition, such as GDP, then the extent of flexibility of the personal income tax will vary according to the source of the GDP increase. A rise in GDP due to increased corporate profits for example will clearly have different

effects from a rise in real wages. Such a definition of flexibility is therefore of limited value. This issue may be expected to be important in many developing countries where changes in balance of payments deficits can significantly affect total tax/GDP ratios via effects on import taxes, for a given change in GDP. Where the same GDP change occurs instead as a result of personal income changes, total tax/GDP ratios may change very little.

The flexibility of Egyptian taxes is therefore discussed with reference to the relevant income definition in Section 10.3.2. The tax/GDP ratios in Table 10.2 do however provide interesting information on the 'burden' of taxation. Firstly it can be seen from the table that the share of total tax revenue in GDP has risen steadily from around 13% in the early 'sixties to 26% by 1978. The early 'seventies witness a brief temporary decline in the tax share possible reasons for which are examined in Section 10.3.

Secondly personal income tax maintains a fairly constant share of GDP (around 1%) while business income taxes rise as a proportion of GDP mainly from 1960 to 1967 and after 1974, remaining stable around 4% in the intervening period.[15] Thirdly, international trade taxes fluctuate over the period, displaying no clear trend, though the ratio is noticeably lower in the late 'sixties and early 'seventies when trade deficits improved, and higher again from 1976. The variability in this ratio bears out the discussion on flexibility above, with changes in the ratio responding to the balance of payments deficits rather than GDP changes per se. Finally commodity tax revenue increases as a percentage of GDP up to 1970 mainly because of the introduction of price differences. However the declining importance of price differences in revenue terms as noted earlier causes the ratio to decline thereafter, the price difference/GDP ratio reaching almost half its 1970 value by 1978.

TABLE 10.2 CENTRAL GOVERNMENT REVENUE, 1960-78

As % of GDP

	1960	1962	1964	1966	1968	1970	1972	1974	1976	1978
Income and Profit Taxes	2.4	2.3	2.7	4.2	4.1	5.1	4.8	4.3	6.0	7.6
Business	1.5	1.4	1.9	3.3	3.1	4.1	3.9	3.5	5.1	6.9
Personal	0.9	0.9	0.8	0.9	1.0	1.0	0.9	0.8	0.9	0.5
Property	1.5	0.4	0.6	0.4	0.5	0.7	0.8	0.5	0.4	0.3
Goods and Service Taxes	1.4	1.3	2.9	2.2	5.8	6.3	5.9	4.8	5.2	4.6
Excise	1.4	1.3	2.9	2.2	n.a.	1.7	2.2	1.9	1.8	2.0
Price Differentials	-	-	-	-	n.a.	4.6	3.7	2.9	3.4	2.6
International Trade Taxes	6.3	7.0	8.3	8.1	6.6	6.8	6.4	5.8	9.9	11.8
Stamp Duties and Other Taxes	1.9	1.7	1.1	1.2	1.8	1.5	1.3	1.4	1.6	1.8
Total Tax Revenue	13.5	12.7	15.6	16.1	18.9	20.5	19.2	16.6	22.9	26.0

10.3 MODELLING THE TAX SYSTEM

The evidence in Section 10.2 may be summarised as indicating that the Egyptian tax system simultaneously exhibits important similarities to, and differences from, the tax/transfer system examined in chapter 5. Although direct taxes are a relatively less important revenue source in Egypt than that implied in the model in chapter 5, and are administered in a more complex way, nevertheless the final outcome is to produce a rate structure which could be fairly accurately modelled by the method described in chapters 4 and 5. The greatest difference between the Egyptian system and the earlier model is perhaps that the latter uses a general sales tax and no commodity-specific taxes while the reverse holds for Egypt. Some of these issues on tax structure are examined in Section 10.3.2 which considers the usefulness of the model in Part 2 to explain revenue growth in Egypt. However the applicability of the model is dependent, not only on the tax functions used, but also on the form of the income distribution to be used. In the next section therefore the applicability of the lognormal distribution to Egypt's earnings structure is considered.

10.3.1 Income Distribution

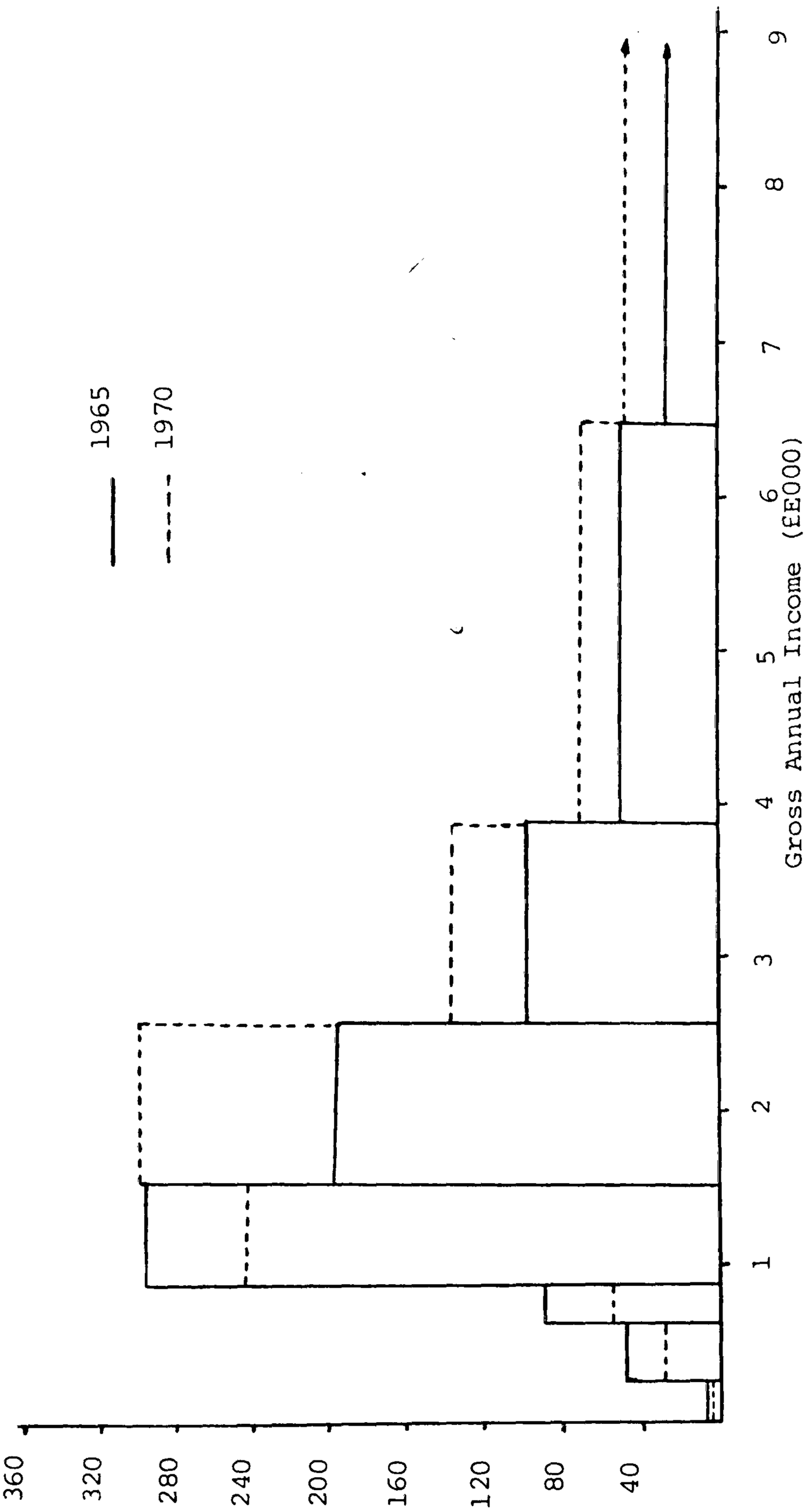
It need hardly be reiterated here that data on the distribution of incomes is particularly scarce or partial in developing countries and Egypt is no exception. That part of the population engaged in agricultural (especially the non-monetised part) and urban informal activities are rarely included in income statistics. It is therefore impossible to obtain a comprehensive picture of income distribution. However for the purposes of constructing and applying a tax revenue

model this is not a serious limitation since the relevant income distribution sought is that of potential tax payers and these are almost exclusively employed in urban, formal activities. For this category a reasonably reliable source of information is available in Egypt in the annual survey of employees, wages and working hours.[16] This evidence has been discussed by Abdel-Fadil (1980) and others and may be readily assessed with reference to the lognormality assumption.

Evidence on the distribution of earnings of all employees in organised industry and services (excluding the Civil Service) is shown in Figures 10.2 and 10.3. Figure 10.2 shows the distribution of gross annual earnings for all wage earners by income group for 1965 and 1970. It can be seen that although the 1970 distribution has shifted to the right of the 1965 distribution, both exhibit the same pattern and are fairly strongly skewed to the right. Median income has been calculated at £E149 p.a. in 1965 and £E160 p.a. in 1970, at constant prices.[17] This at least provides grounds for suspecting that the distribution may be approximately lognormal. Figure 10.3 gives the associated cumulative frequency ogives for each year and the Lorenz curve for 1965. (The 1970 curve is almost identical on the scale shown). The ogives also appear broadly similar to those associated with a lognormal distribution of incomes.

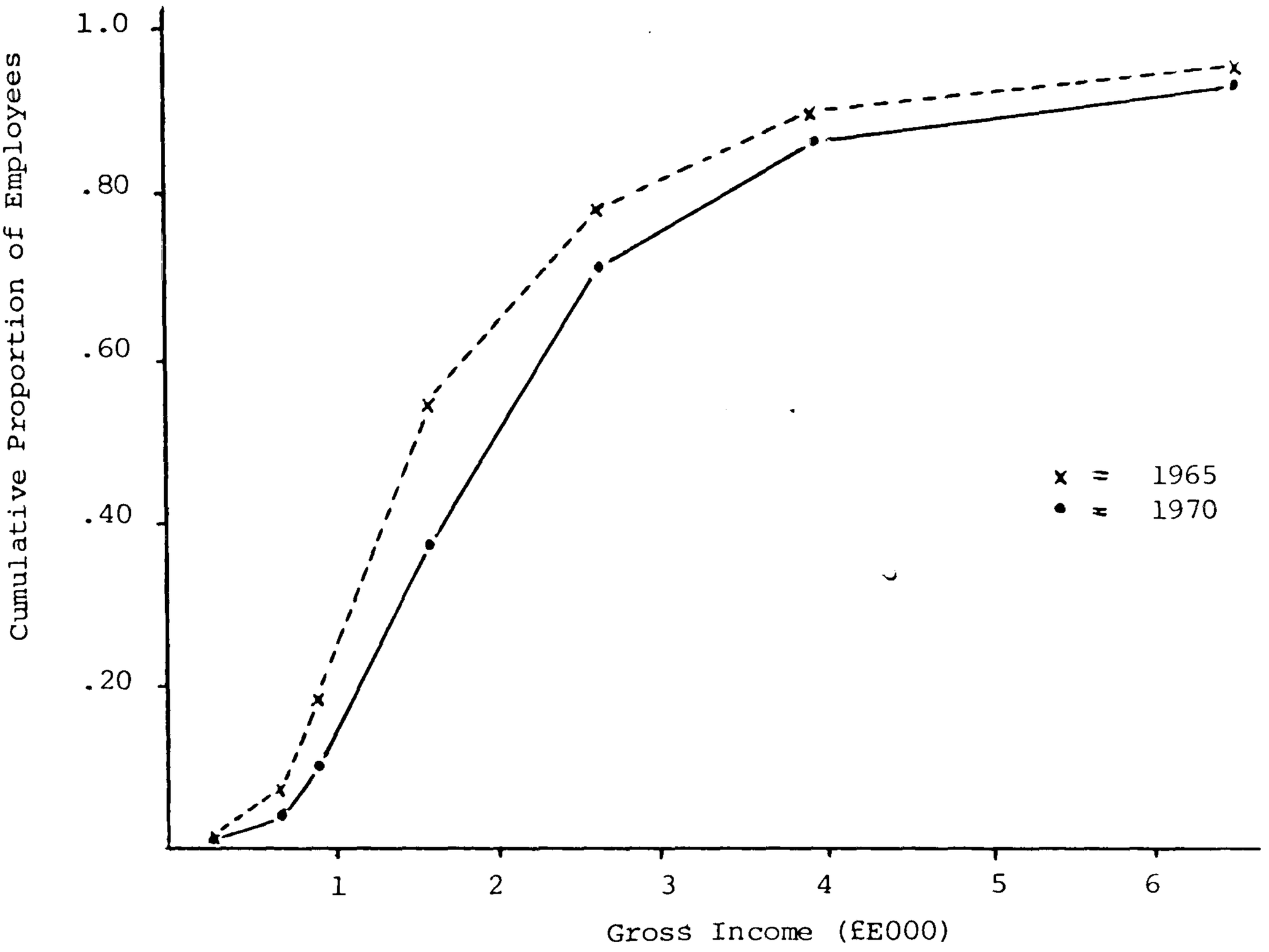
As can be seen from the ogives in Figure 10.3 there are insufficient data points to produce meaningful results from standard tests for lognormality.[18] However two simple tests can be applied. Firstly, if an income distribution is perfectly described by the lognormal distribution then the associated Lorenz curve will be symmetrical about an axis (AB in Figure 10.3) which intersects the Lorenz curve where income reaches its mean value. Thus the tangent at E will be parallel to

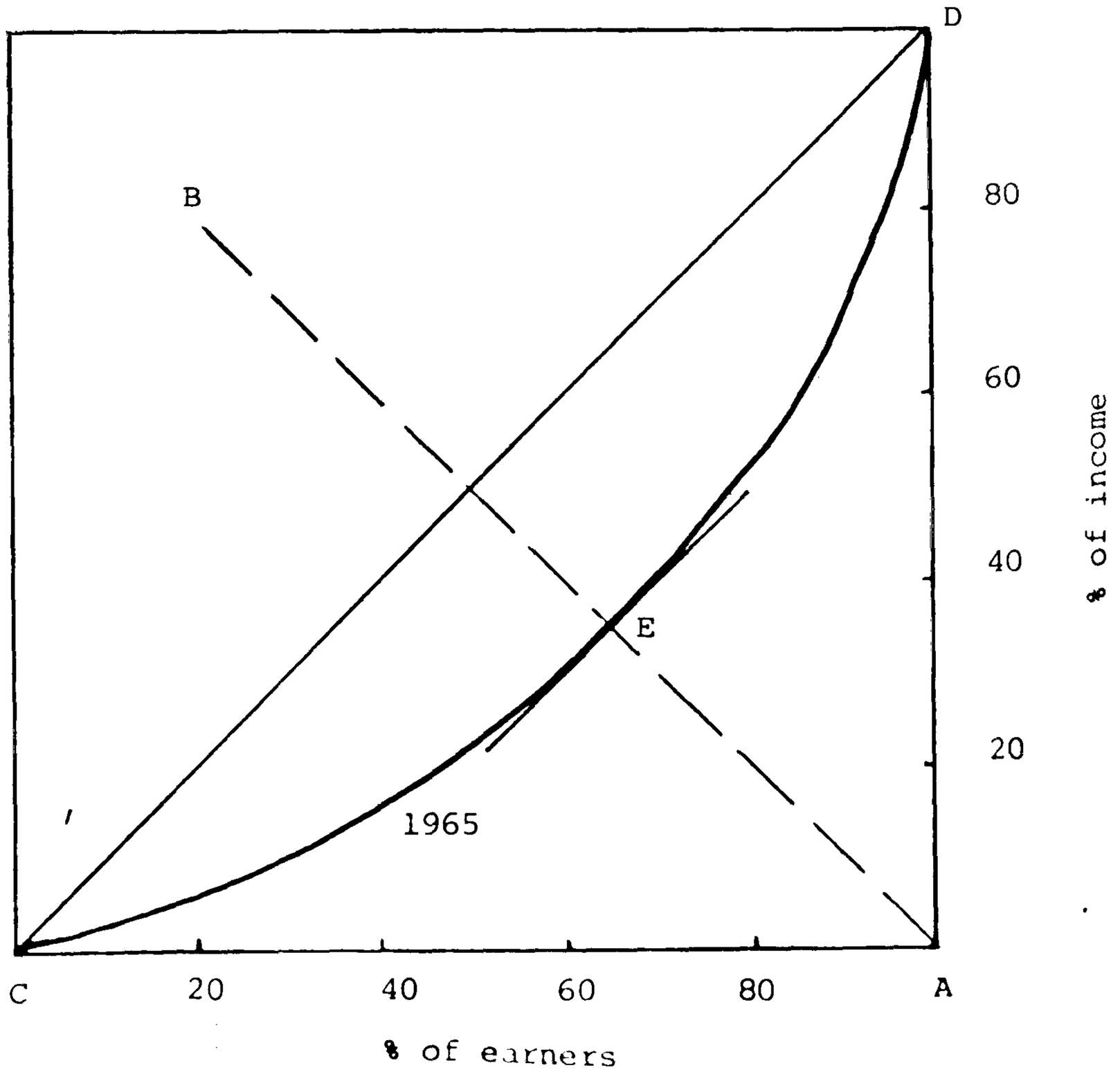
FIGURE 10.2 DISTRIBUTION OF INDUSTRY AND SERVICE SECTOR EMPLOYEES BY INCOME CLASS, 1965 AND 1970



Source: Figures from Abdel-Fadil (1980, p. 54).

FIGURE 10.3 OGIVES AND LORENZ CURVES, 1965 AND 1970
(EMPLOYEES IN INDUSTRY AND SERVICES)





CD. It is clear from Figure 10.3 that the Lorenz curve, while not perfectly symmetrical, does exhibit a high degree of symmetry.

The second test makes use of the properties of the normal distribution in which the distance between the median and the lowest decile, (quintile, quartile etc.) will be the same as the distance between the median and the highest decile (quintile, quartile etc.) If income is lognormally distributed this property will apply to the logarithm of income, and the ratios of median/lowest decile and highest decile/median will be equal.[19] Table 10.3 presents estimates of the relevant distances and ratios involving the median and the highest and lowest 10%, 20% and 30% of income earners, for 1965 and 1970. It is clear from the table that the distances between the median and the highest and lowest percentiles are far from equal, rejecting the assumption of normality. The distance from the median of the highest 30% for example is more than three times that of the lowest 30%, in both years. However, the assumption of normality of logarithms seems much more acceptable, with the ratios of the various highest and lowest percentiles being fairly close, particularly in 1970. The more the extremes of the distribution are emphasised the less this is true: the ratios for the highest and lowest decile can be seen to differ more than the highest and lowest quintile for example.

Although these tests are not precise it does seem that a tax model incorporating a lognormal income distribution can be used appropriately to examine tax revenue growth in Egypt. That is, the distortions arising from the use of a lognormal distribution of incomes should be sufficiently small to allow valid conclusions on the Egyptian tax system to be drawn, ceteris paribus, from the tax model.

TABLE 10.3 INCOME DISTRIBUTION STATISTICS, 1965 AND 1970

1965	Percentage of Median	Distance from Median	Ratios of Median/lowest percentile and Highest percentile/median
Lowest 10%	33.6	66.4	3.35
Lowest 20%	41.6	58.4	2.40
Lowest 10%	46.6	53.4	2.15
Median	100.0		
Highest 30%	259.4	159.4	2.59
Highest 20%	324.8	224.8	3.25
Highest 10%	437.6	337.6	4.38

1970			
Lowest 10%	31.3	68.7	3.20
Lowest 20%	40.0	60.0	2.50
Lowest 30%	50.4	49.6	1.98
Median	100.0		
Highest 30%	256.6	156.6	2.57
Highest 20%	294.4	194.4	2.94
Highest 10%	398.8	298.7	3.99

10.3.2 Revenue Growth

This section will consider the ability of the tax model developed in Part 2 to interpret tax revenue growth in Egypt. It is therefore necessary to establish where the tax model results in chapter 5 are applicable to Egypt and where they are not. In cases where the Egyptian tax structure is sufficiently different from that modelled earlier so that the model's general properties cannot be assumed for the Egyptian case, possible modifications of the model are suggested. Where appropriate the model's properties will be used to help explain actual tax flexibility in Egypt. Each of the taxes discussed in Section 10.2.1 will be examined in turn.

Income Taxation

It is helpful at this point to recall some of the important features and properties of the personal income tax in the tax model in Part 2. Income tax was payable on all gross incomes above an exemption level a_1. A range of incomes was allowed for (between a_1 and a_2) which were taxed at a 'standard' rate (optional). Above a_2 a structure of higher marginal tax rates were described by a non-linear function. This produced an effective average rate schedule, $R_t/\bar{y}$, measuring built-in flexibility which was sigmoid in shape and increased particularly steeply at low average income levels relative to the tax thresholds. It was shown that with positive real earnings growth, while indexation of the tax thresholds to nominal incomes removed all built-in flexibility, indexation to prices allowed substantial increases in $R_t/\bar{y}$ though obviously much less than when thresholds are not indexed at all (depending on the rate of price increase). Though it was not shown in Chapter 5 threshold indexation at more than the rate of nominal income increase would obviously cause the effective average tax

rate to decline as average income rises.

Considering the earlier discussion of the Egyptian income tax structure it would seem that this part of the model can be readily applied to Egypt. The rate structure in Figure 10.1 is very similar to that shown in Figure 4.1 for the U.K. Three main differences between the two systems do need to be taken into account but these would not significantly affect conclusions on built-in flexibility. Firstly unlike the U.K., Egypt uses a 'two stage' system of specific then general income taxation. Theoretically these need separate modelling. However the negligible proportion of the population liable to pay general income taxation means that it does not significantly affect revenues.

Secondly, the interdependencies between these two income taxes and the social insurance tax are different from those in the earlier model. In the model income tax and N.I. are both based on gross incomes. However in Egypt the social insurance tax base is gross income, the specific income tax base is gross income minus social insurance premiums and the general income tax base is gross income minus all specific income taxes and social insurance premiums paid. Thus, in the model the order of calculation of R_c and R_t did not matter, but for Egypt it would be necessary to calculate R_c first, then $R_{st.}$ (specific income taxes) based on $y - C(y)$ and then $R_{g.t.}$ (general income tax) based on $y - C(y) - ST(y)$, where $ST(y)$ is specific income tax payments. Clearly if there is significant built-in flexibility in the social insurance tax, the flexibility of the income taxes may be different from that derived in the model and will be sensitive to changes in the structure of social insurance. In fact the social insurance tax is an almost proportional tax in Egypt so that (as in the model) its built-in flexibility will be very small. The

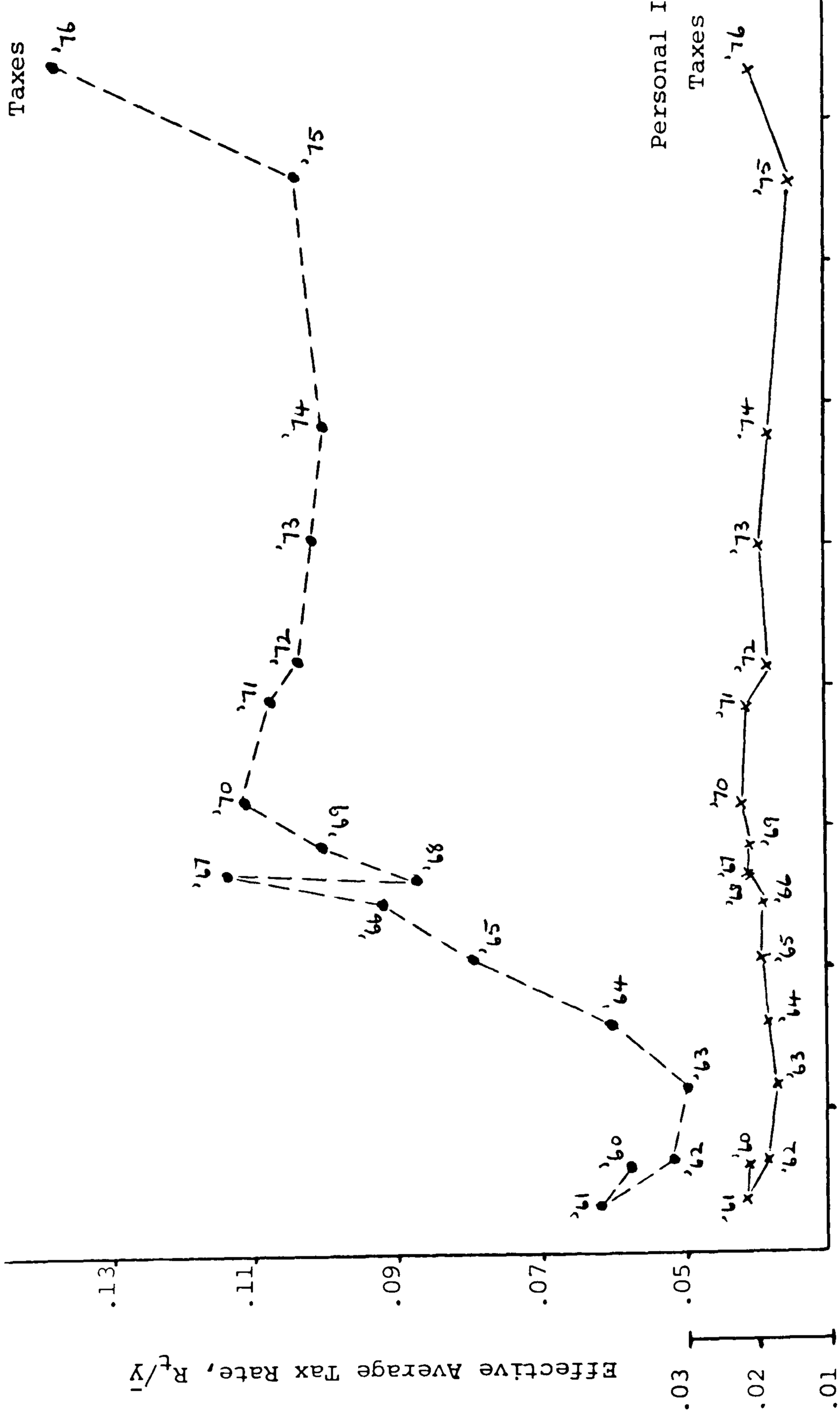
distribution of post-social insurance premium income will therefore be very similar to that of gross incomes and the flexibility of specific income taxes will be affected very little.

Thirdly, as can be seen in Figure 10.1 it would be preferable to model the structure of wages and salaries tax separately from that of professional incomes. A 'standard' rate would appear to be most appropriate for the latter but not for the former.[20]

It seems therefore, despite these three caveats that the results from the model on income tax flexibility can be broadly applied to Egypt. In the absence of any indexation of its thresholds, income tax revenue would be expected to be small in relation to average income but rising steeply as indicated by the sigmoid schedule in Chapter 4. Figure 10.4 presents evidence on the effective average income tax rate, $R_t/\bar{y}$ in Egypt over the 1960-76 period and it can be seen that although total income taxes (i.e. including profits taxes) show steep rises in the mid-'sixties, the effective average rate of personal income taxes is remarkably constant.[21] The main discernible trends are a slight fall to 1963, a slight rise to 1970 and subsequent decline again to 1975.

The reasons for the Egyptian income tax system's failure to demonstrate any sizeable flexibility may be summarised as regular discretionary action by government, and problems of tax evasion, which had the effect of restricting or reducing $R_t/\bar{y}$. The decline in $R_t/\bar{y}$ to 1963 (for both business and personal taxes) would seem to be the result primarily of two factors. Firstly the nationalisations and state sequestrations in 1961 and 1962 cut the highest incomessubstantially, particularly those employed in the Civil Service. General upper earnings limits were imposed and, at least in the short-term, were effective in reducing the concentration of incomes.[22] Since

FIGURE 10.4 EFFECTIVE AVERAGE INCOME TAX RATES, 1960-76



this was achieved by reducing top incomes rather than increasing lowest incomes (though increased benefits were also paid) it reduced income tax revenue. In addition government controlled companies are exempt from profits tax so that nationalisation reduced the tax base for business taxation.

The rise in $R_t/\bar{y}$ to 1970 can be only partly explained by changes in the parameters of the tax model. The increase in $R_t/\bar{y}$ is mainly due to business tax increases though some rise for personal taxes is also evident. Undoubtedly the rise in profit of the Suez Canal Authority contributed substantially to the rise in business taxes. $R_t/\bar{y}$ can be seen to fall back sharply in 1968 following the canal's closure.[23] The structural changes occurring in the economy at this time would also create additional business taxes. The increase in the importance of industrial and commercial activities in the economy as a whole would give rise to increased business taxes (and some personal taxes depending on profits distribution) because these sectors were the ones subject to company taxation.

The rise in personal income taxes can be seen to be very slight except in 1966 to 1967. This reflects the relatively large increase in the 'defense' component of income tax rates (from 7% to 10.5%) in January 1966 which predictably increased revenue. Also, according to Lotz (1966), revenue increased after 1966 because of collection of tax arrears from the early 'sixties. The general failure of personal income tax revenues to rise relative to $\bar{y}$ however both during 1963-70 and after 1970, is attributable mainly to the persistent discretionary increases in exemptions from income tax which had the effect, in terms of the model, of increasing thresholds as fast, and sometimes faster, than incomes. Ikram (1980) suggests that although thresholds were often not regularly and explicitly increased, nevertheless persistent

increases in the non-taxable minimum income made an increasing number of incomes tax-exempt. Increased coverage of, and rate changes in, the social insurance schemes have contributed to increased income tax exemptions. It also seems likely that tax evasion increased again in the 1970s after the abolition of the Tax Evasion Office in 1972. It had probably not been very effective, but the absence of any disincentive to understate tax liability and the increased incentive to do so from rapid money wages rises in the early 'seventies can be expected to have combined to increase tax evasion. In fact, draft plans in 1976 to restructure the tax system and the reopening of the tax evasion office in the late 'seventies (with financial incentives to tax collectors to reduce evasion) were directly linked to government concern over revenue loss through evasion.

In summary therefore it would seem that a combination of discretionary actions by the authorities outside the parameters of the tax model, and threshold increases as suggested by the model have prevented the Egyptian income tax system from demonstrating a significant degree of revenue growth despite its inherent built-in flexibility. Undoubtedly if tax evasion can be controlled, tax authorities in Egypt could benefit from income tax revenue increases as incomes rise in general, simply by avoiding discretionary changes in rates and thresholds. The desire to increase revenues during the period (for example to raise revenue for the 1967 war), have been thwarted by simultaneous exemption increases.

Social Insurance Taxation and Benefits

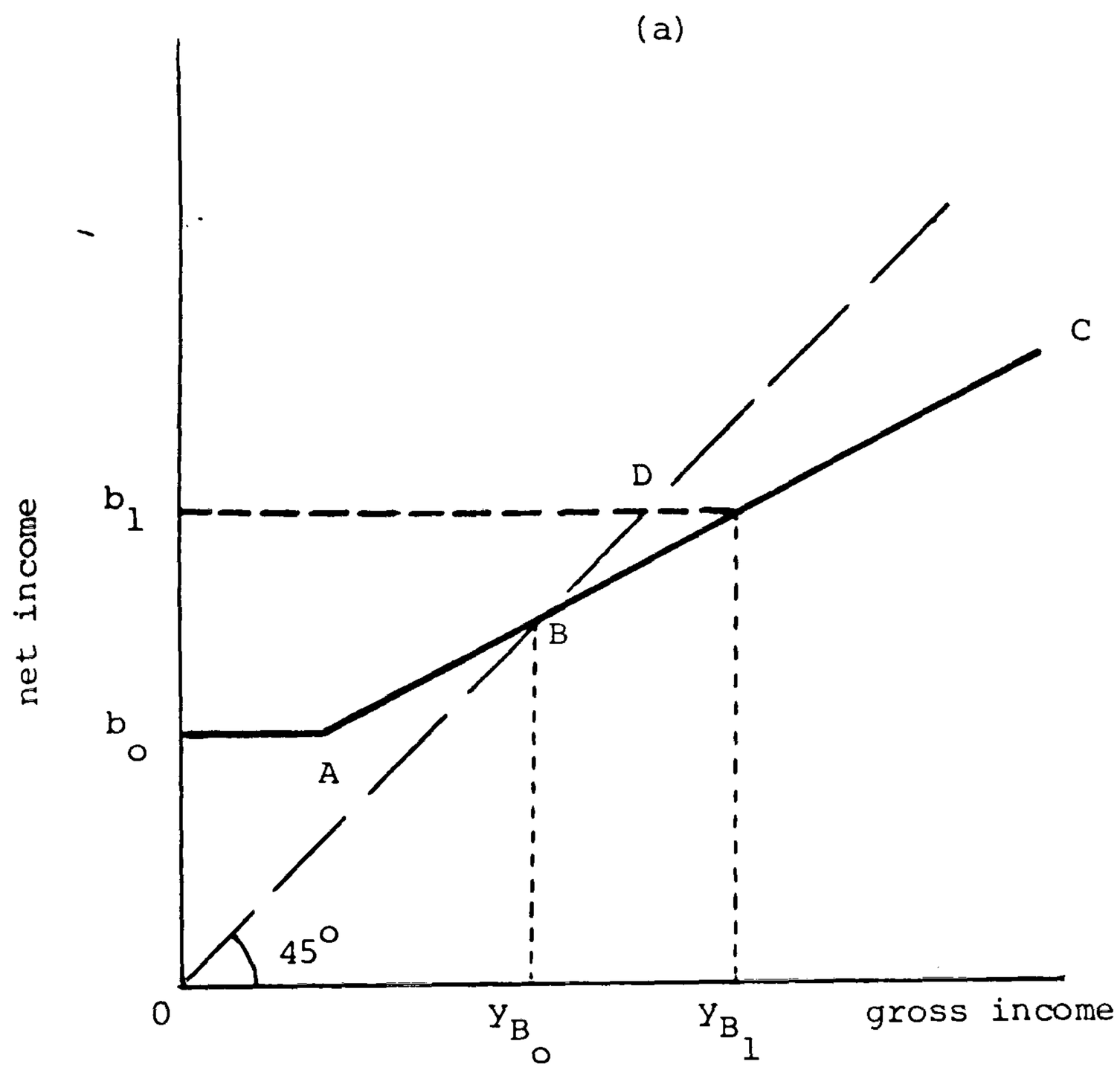
Since data are not available on the value of social insurance revenue or total benefit payments it is not possible to assess actual insurance revenue or expenditure on benefits. However certain features

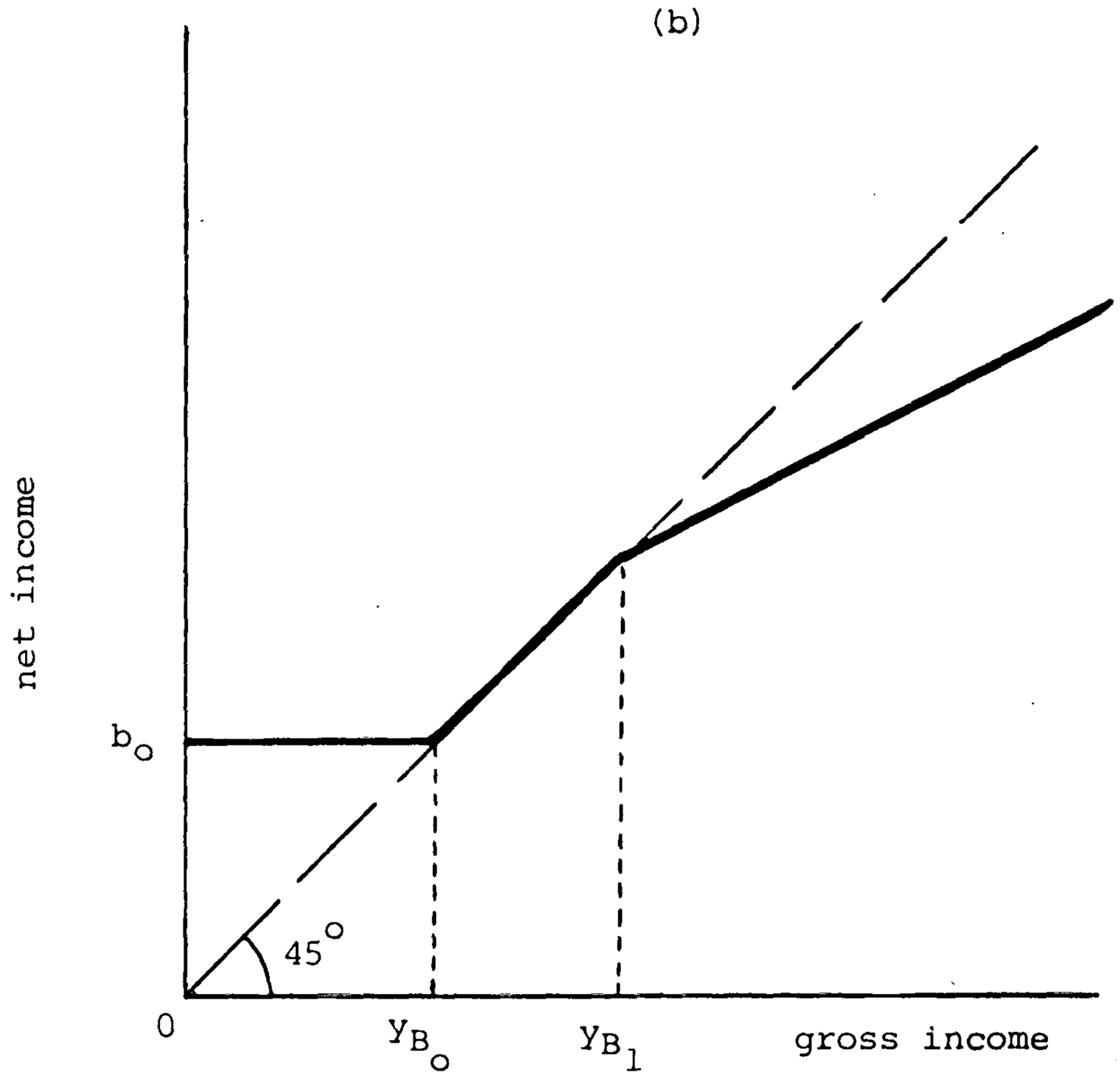
of the system may be examined. Firstly it was stressed earlier that although coverage of Egypt's social insurance legislation was fairly wide in comparison to other LDCs, it nevertheless remains partial, covering essentially government, industrial and commercial employees. The rural/agricultural population is particularly poorly covered. For an assessment of the distributional implications of the system these considerations are clearly critical. However in assessing the revenue implications only those paying premiums and/or receiving benefits are relevant. So long as the distribution of income earners considered is also the distribution of (potential) tax payers/benefit recipients the tax model can be usefully applied. In fact, at least since the early 1960s most income earners included within the income distribution statistics discussed in section 10.3.1 will participate in the social insurance scheme.

The first point that can be made about the social insurance tax is that it is almost exactly proportional with no upper or lower thresholds as in the N.I. tax in the model in Chapter 5, and a common marginal tax rate for all employees within each scheme.[24] Thus it may be expected that revenues from the social insurance tax will not rise significantly as average income rises. It will of course rise to the extent that more employees join the scheme, which may happen concurrently with increases in income. However there is unlikely to be any inherent built-in flexibility within this tax structure, and therefore the results of the earlier model should be broadly applicable in this respect. The main difference is likely to be that the regressivity apparent in the U.K. N.I. system (due to the upper limit, y_u) does not operate in Egypt and therefore similarly the slight decline in $R_t/\bar{y}$ observed as $\bar{y}$ rises in that system will not apply to Egypt.

On the benefits or transfer payments received differences in the Egyptian system would certainly dictate some changes to the model. Firstly there is unlikely to be a significant number of individuals who both pay income taxes and receive transfer payments. The Egyptian benefits system is fairly well restricted to pensioners and certain unemployed (plus disabled etc.) who are unlikely to be liable for income tax payments given high exemption levels. Figure 10.5 shows two approximations likely to be more appropriate than that used in the previous model. Figure 10.5(a) shows the relationship between gross and net incomes (at lower income levels). The approximation used in Chapter 5 is shown by the 100% marginal tax rates faced by all earners below y_{B_1} who receive benefits of b_1. An alternative, more likely to operate in Egypt is given by the line b_oABC. Here incomes above y_{B_o} pay income tax and those below receive transfers. Those between A and B, although they receive smaller transfers than those below A, do not face 100% effective marginal tax rates. This schedule also reflects the fact that in Egypt probably only the lowest income earners (within the group of income earners considered) face 100% tax rates. Those receiving unemployment benefit would be in this group, while many pensioners can increase their gross incomes without losing any, or an equivalent amount of, transfer payment.[25] An alternative relationship between gross and net income for Egypt is shown in Figure 10.5(b) where income earners between y_{B_o} and Y_{B_1} neither pay income tax nor receive benefits. Those below Y_{B_o} are shown as receiving a fixed net income b_o, though clearly a system more like that in Figure 10.5(a) could operate here. It seems likely that in Egypt a (possibly large) proportion of income earners pay no income taxation (though some may pay social insurance premiums) and do not receive any transfers. Only those on

FIGURE 10.5 ALTERNATIVE TRANSFER PAYMENTS SYSTEMS





relatively low incomes, such as retired government employees receive transfer payments.[26]

Without more information it is impossible to be certain on which system may provide the most suitable approximation of Egyptian transfer payments. It may be noted however that for a given average income tax rate (determining the slope of BC) the 'Egyptian' systems must be less generous than that used in the previous model. The results on net transfers flexibility in chapter 5 were that indexation of the benefit level, b, to nominal earnings could maintain the effective average transfer, $NT/\bar{y}$, as average income rose, but lesser indexation must necessarily reduce $NT/\bar{y}$.[27] This occurred because, in terms of Figure 10.5(a), if b_1 increases commensurately with $\bar{y}$, the triangle oDb_1 will likewise increase in proportion to $\bar{y}$. Examining Figure 10.5 it can be seen that the same situation could pertain under the two alternative 'Egyptian' cases. In Figure 10.5(b) indexation of b_o to $\bar{y}$ will increase the triangle OEb_o in proportion. In Figure 10.5(a) the outcome of indexing b_o to $\bar{y}$ will depend on how the whole structure of transfers is adjusted. For example if b_o rises with $\bar{y}$ but the section of the relationship given by ABC does not similarly shift such that 100% effective tax rates operate over a wider range of gross incomes the benefit system would clearly become more generous relative to average income. However if all benefit thresholds adjust such that the whole line b_oABC shifts in proportion to $\bar{y}$ (and not just the section b_oA) then transfer payments could be expected to rise in proportion to $\bar{y}$. It would seem therefore that, as in the model in chapter 5, it is less likely that transfer payments will increase relative to average income than vice versa as a result of their built-in flexibility. In inflationary periods particularly, the degree of indexation of benefit levels will obviously be crucial to

their flexibility.

Finally in each of the cases considered above the assumption of a fixed population of income earners has been maintained. It should be remembered however that with taxation and transfers covering mainly government and industrial employment, and in the presence of structural changes towards these sectors, the proportion of the population eligible for transfer payments may be increasing. In particular rises in per capita incomes may be associated with increased migration of the poor from rural to urban areas which can then cause the proportion of the population receiving even a fixed level of benefits to rise rather than fall as incomes increase. Thus the 'benefit burden', $NT/\bar{y}$, could rise because of increased coverage.

Indirect Taxes

In Section 10.2 it was shown that international trade taxes are an important source of tax revenue and some comments on their flexibility were made. The model in chapter 5 however did not attempt to examine this type of tax and cannot therefore be used to examine the flexibility of these taxes. This section will be confined to consideration of domestic commodity taxation.

Egypt, as noted earlier, does not yet use a general sales tax similar to the VAT used in the tax model. However the model results do provide useful information on the built-in flexibility properties such a tax may be expected to possess. The results for VAT revenue in chapter 5 may be summarised as indicating that the effective average rate of VAT, $R_v/\bar{y}$, is relatively fixed as $\bar{y}$ rises. It is sensitive to different indexations of income and social insurance taxes, but even at its most flexible, $Rv/\bar{y}$ only varied by about 2

percentage points over a wide range of average incomes (see Figure 5.4). This relative constancy in $R_v/\bar{y}$ is to be expected from a tax which has limited progressivity.

The methodology used in the model can however be used to examine the flexibility of existing commodity taxes in Egypt. As shown in Section 10.2 these consist of consumption/excise duties usually fixed in nominal terms and price differences which for analytical purposes are similar to the excise duties. The method used in chapter 5 to analyse VAT revenues was to examine the consumption pattern between VAT-rated and non-VAT-rated goods across expenditures, obtain a functional form to describe that pattern and combine this with the rate of tax. It was suggested that where specific duties also operated, they could be incorporated in the model by similarly describing the consumption pattern of the commodities in question and combining this with the tax 'rates' on these commodities.

This exercise, though requiring more information, can in principle be applied to the Egyptian commodity tax system. First it is necessary to obtain separate information on the consumption of commodities bearing different excise/price differences across expenditure groups (i.e. separate r(q) schedules for each commodity). These may be combined with the effective indirect tax 'rates' on these commodities to yield total indirect tax revenues.[28] The built-in flexibility of this revenue may then be examined for a given set of excise 'rates' and consumption patterns. Changes in these 'rates' may also be examined (as with changes in the VAT rate). The extent of built-in flexibility will therefore be determined mainly by the degree of dispersion of consumption of each commodity across income/expenditure groups, and which commodities bear the highest tax 'rates'. It was suggested

in Section 10.2 that it is likely that some commodities bearing specific duties are most heavily consumed by those on lower incomes, while for others the reverse probably holds. Subsidies, which may be treated as negative tax rates, are mostly on goods consumed mainly by those on low incomes.

Some evidence on commodity consumption patterns and indirect tax progressivity in Egypt has been collected by Abdel-Fadil (1980). His evidence, which he recognises to be partial and tentative was obtained by allocating tax revenue from a set of commodities, to households (grouped by expenditure class) according to their consumption of these commodities. This suggested that overall the Egyptian indirect tax structure (in the late 1960s) was slightly regressive with the exclusion of subsidies, but approximately neutral when subsidies were included.[29]

If these results are even approximately correct they lend support to the view that the flexibility of indirect taxes in Egypt is likely to be small, similar to that found for VAT in the tax model. It may also be recalled that simulating radically different consumption patterns in chapter 5 did not produce significant differences in VAT revenue flexibility. This would suggest that unless indirect taxes can be structured in a highly progressive or regressive manner they cannot be made to be strongly progressive or regressive, since revenue is relatively insensitive to commodity consumption patterns. They are therefore unlikely to exhibit much flexibility.

Finally in the tax model the inclusion of a transfer system had the effect of reducing VAT revenue because the incomes of the low paid were increased, relative to upper incomes, and they also consumed proportionately more non-VAT goods. If, in Egypt, the low paid spend a higher proportion of their incomes on taxed (or most heavily

taxed) commodities, a transfer system will have the effect of raising indirect tax revenue above what it would otherwise be. This does not mean, of course, that it will necessarily be more flexible.

10.4 SUMMARY AND CONCLUSIONS

This chapter has presented some evidence on the growth of various tax revenues in Egypt during the 1960-76 period. It has also attempted to show how the tax model developed in Part 2 could be applied to the Egyptian tax system, how it might be modified for this purpose and, with the limited information available, what built-in flexibility the Egyptian system is likely to exhibit.

It was shown that international trade taxes are an important tax revenue source and are outside the terms of the tax model considered. These revenues tend to fluctuate according to exchange rate and balance of payments movements. They cannot be expected therefore to exhibit much stability with respect to income. Apart from trade taxes, direct taxes (on income and profits) were a more important revenue source than indirect taxes, accounting for almost 30% of total tax revenue by 1978. It was argued that personal income taxes in Egypt should exhibit similar built-in flexibility to that shown in the tax model in Part 2. However persistent exemption increases, in some cases by more than average incomes were increasing, and tax evasion problems meant that actual flexibility was negligable for most of the period. For the transfer payments system and commodity taxes in Egypt, the tax model obviously needs most adjustment. Nevertheless it was argued that the models results of limited flexibility and the likelihood of constant or decreasing effective average rates for these components probably also applied to Egypt.

It would however be necessary, with more information, to modify the model formally, before these suggestions could be confirmed.

Tax authorities in Egypt in recent years have become increasingly aware of the need to raise tax revenues to finance expanding non-market government expenditures. When these increases could be attributed mainly to rises in defence expenditures they could rely on fairly generous funding from other Arab states, Saudi Arabia in particular. This is no longer the case and the tax authorities have sought ways to increase revenue. The introduction of an ad valorum sales tax as proposed could raise substantial amounts of revenue especially in an inflationary climate if prices rise faster than incomes. It has been shown that tax rate changes in this type of tax can significantly raise revenue though general increases in incomes cannot be relied upon to automatically increase tax revenue.

General revision of the income tax structure and the eradication of much of the existing tax evasion could be expected to increase revenue. Revenue from an income tax structure similar to that in the model in chapter 5 responds considerably to discretionary increases in tax rates and general increases in nominal incomes. A reliable and sensible indexation policy is however required if income tax revenue growth is to be predictable.

Finally if Egypt continues to expand the coverage and quality of its transfer payments system the burden of financing it could significantly increase. At present the government seems to be attempting to create a social insurance scheme which, when fully operational, will be self-financing. This will probably require further increases in contribution rates. However there are also clear opportunities for extending the coverage of taxation. Agricultural incomes and property in general for example are either subject to minimal levels of taxation or taxed regressively at present.

Footnotes

1. Subsequent studies of taxation in Egypt have often had to rely on the information in these two studies. See, for example Abdel-Fadil (1980, pp.71-88).

2. See National Bank of Egypt, Economic Bulletin, 1977, no. 2, p.132.

3. More detailed discussion may be found in I.L.O. (1962), Hansen and Marzouk (1965), Lotz (1966), El-Sheikh (1968) and Abdel-Fadil (1980).

4. One effect of the defence tax is of course that the higher rate applicable to professional incomes compared to other wages and salaries, raises the rates of taxation for higher professional incomes (above about £E2000 in Figure 10.1) above the tax rates for similar non-professional earnings. An additional complication arises for income from some sources, whereby if total income from that source is less than twice the relevant exemption level, only half the tax liability (as calculated from the rate structure) is payable). See Appendix 10.1.

5. El-Sheikh (1968) estimates that income tax allowances are about 4-5 times per capita national income. Lotz (1966) calculates that an average unskilled worker (earning about £E100 per annum in the early 1960s) would pay no tax, while an average skilled worker would be liable to pay tax of £E1.38 on an annual income of £E320. See Lotz (1966, pp.130-131).

6. Government contributions were raised to 12½% in 1961.

7. An orphan, both of whose parents were dead, or whose father was dead and mother remarried, was eligible for a pension.

8. For more details see I.L.O. (1962), Lotz (1966, pp.138-139) and Abdel-Fadil (1980, pp.118-119). The government's social insurance scheme includes health, old age, accidents and unemployment insurance.

9. The length of employment (or years of contributions) is often used in relatively new schemes, where employees have not been able to accumulate sufficient contributions.

10. Goods which are subsidised include wheat (and flour), maize, edible oil, sugar and kerosene.

11. See Lotz (1966, p.150).

12. See Abdel-Fadil (1980, p.81).

13. Absolute values of tax revenues are given in Appendix 10.2.

14. Land and buildings taxes for example are based on the 'annual rental value' of the property which may only be reassessed every ten years. See Lotz (1966, p.132-134).

15. In 1967 the business income tax/GDP ratio (not shown in Table 10.2) reached 4.2%.

16. See C.A.P.M.S., Statistics of Employment, Wages and Working Hours.

17. Abdel-Fadil (1980, p. 54). Mean real income in both years is about £E200.

18. See Aitchison and Brown (1957, pp.28-36).

19. See Atkinson (1975, pp. 77-8).

20. This would also require separate distributions for the incomes of professional and non-professional workers.

21. $\bar{y}$ is measured here as average annual wages rather than GDP, because it represents the more appropriate base for income taxes.

22. For more detail on the redistribution during this period see Hansen and Marzouk (1965, p.267) and Mabro (1974, pp.222-225).

23. Reductions in canal tax revenues contributed to the constancy in the business $R_t/\bar{y}$ ratio after 1968. After 1975 however renewed canal revenues and profits from oil exploitation enabled business profits to rise relative to average income. See Ikram (1980, p.320).

24. Insofar as rates have varied at times between schemes (e.g. public and private sector), revenue may vary to the extent that the shares of these sectors in the total labour force paying contributions varies.

25. Notice that if 100% effective rates are inappropriate the line AC can instead be continued to the vertical axis to model this.

26. For discussion of the properties of these alternative systems see Creedy (1982a).

27. The flexibility of total transfers is of course not relevant here because in Egypt transfer recipients do not in general pay income taxes.

28. For a given set of commodity prices, excise taxes/price differences can be translated into a percentage tax 'rate'.

29. See Abdel-Fadil (1980, pp. 82-87).

APPENDIX 10.1

TAXATION OF PERSONAL INCOMES, 1963

Specific Income Taxes (Taxes at source)				*General Income Tax* (Surtax levied on person)		
(1) Source	(2) Tax base	(3) Exemptions	(4) Tax rate(s)	(5) Tax base	(6) Exemptions	(7) Tax rates
Land (cultivable)	Rent or annual rental value as fixed by commissions *minus* £E 4 if total tax less than £E 20	Land distributed under Land Reform Acts	14 per cent + 7 per cent (defence tax) = *21 per cent* (plus 11–15 per cent municipal tax)	Total income of an individual from all sources as assessed for the payment of the specific taxes at source *minus* interest on loans payable by taxpayer; premiums for pensions, etc.; all other specific taxes; certain donations; £E 50 for wife and each child up to £E 200, if taxpayer's income is less than £E 2 000.	Incomes less than £E 1 000 plus the deductions allowed for dependents.	8–90 per cent (according to size of income).
Buildings (in specified cities)	Rent or annual rental value as fixed by commissions *minus* 20 per cent for expenses	Buildings with an annual rental value of less than £E 18 per tax payer	10–40 per cent (according to rent per room) + 5 per cent (defence tax) = *15–45 per cent*			
Interest, dividends and other income from "movable" capital	Interest, dividends, owner shares, fees of board of directors and shareholders, etc.	Mainly to avoid double taxation	17 per cent + 7 per cent (defence tax) = *24 per cent*			
Commercial and industrial profits	Net profits of all business transactions *minus* rent of premises, "normal" depreciations, other taxes paid, certain donations, appropriations to provident and pension funds, interest and dividends taxed at source	Income under £E 150–250 (depending on family). Incomes within twice this size free of half the tax	17 per cent + 7 per cent (defence tax) = *24 per cent*			
Wages, salaries, pensions, and annuities	Total amount of income *minus*, for Government officials, pension contributions; for all others, 7.5 per cent	Incomes under £E 150 (single) £E 250 (with family). Incomes within twice this size free of half the tax	2–22 % (according to size of income) + 1–4 % (defence tax) = *3–26 %*			
Wages paid daily (workmen)	Total wage	Daily wages less than 30 piasters	30–60 pt: *1 per cent* over 60 pt: *2 per cent*			
Income from non-commercial professions	Total net income	As for wages, salaries and annuities	11–22 per cent (according to size of income) + 7 per cent (defence tax) = *18–29 per cent*			

Source: Hansen and Marzouk (1965, p.258).

APPENDIX 10.2 CENTRAL GOVERNMENT REVENUE, 1960-78

Million Egyptian Pounds

	1960	1962	1964	1966	1968	1970	1972	1974	1976	1978
Total Revenue	253.9	307.3	368.9	473.7	484.0	618.0	663.6	780.1	1352.5	2883.6
Total Tax Revenue	175.3	179.4	271.9	341.8	414.0	523.9	583.6	682.9	1251.5	2034.1
Income and Profit Taxes	31.4	31.8	47.3	88.9	90.1	130.4	146.1	176.4	325.3	590.3
Business	19.7	20.0	32.8	70.5	68.5	104.3	120.2	142.5	277.6	538.4
Personal	11.7	11.8	14.5	18.4	21.6	26.1	25.9	32.9	47.7	51.9
Property	19.8	6.0	11.2	9.2	11.7	18.8	23.8	21.3	19.2	22.5
Goods and Service Taxes	18.5	18.4	49.6	45.9	127.5	161.4	181.2	195.3	283.6	360.3
Excise	-	-	-	-	-	42.7	68.2	78.3	98.1	155.2
Price Differentials	-	-	-	-	-	118.7	113.0	117.0	185.5	205.1
International Trade Taxes	80.7	98.8	144.3	172.2	144.3	173.9	193.7	237.4	537.8	919.8
Stamp Duties and Other Taxes	24.9	24.4	19.5	25.6	40.4	39.4	38.7	58.5	85.6	141.2

Source: Ikran (1980)

P A R T 4

CONCLUSIONS

This part of the thesis draws together the aspects of structural change and public sector growth during development which have been explored in Parts 2 and 3. In chapter 11 the arguments and evidence from earlier chapters are summarised and some general conclusions and observations are offered.

It should already be clear that the processes causing structural changes toward services and their consequences, are not fully understood by economists. Further work is required in various areas, and chapter 12 considers possible directions for future research.

C H A P T E R 1 1

SUMMARY AND CONCLUSIONS

11.1 INTRODUCTION

This thesis has been concerned primarily with three related aspects of the growth of service sectors during development. It was desired firstly to examine the extent of uniformity across countries in patterns of structural change involving service sectors. Secondly, since the growth of publicly-owned, non-marketed services has been prominent in many countries this study has attempted to examine and compare some of the likely effects of such an expansion. This growth in non-marketed services has caused problems of government finance in several countries in recent years, as tax revenues have proved less easy to raise than government expenditure. This thesis has therefore examined the built-in flexibility properties of various widely used taxes in order to assess the prospects for tax revenue growth. Finally a case study of the Egyptian economy from 1960 to the mid-1970s was undertaken which examined the three aspects of service growth during development discussed above, and sought to explain the rapid growth in service sector employment observed in Egypt over this period.

The results and conclusions of this study will be summarised in this chapter in three sections. Section 11.2 summarises the evidence on structural change towards services identified internationally (in chapter 2) and in Egypt (chapters 6-8). Section 11.3 examines the role of a market/non-market distinction in analysing countries' overall macroeconomic performance, and particularly that of Egypt. Finally in Section 11.4 the results of the tax models considered in chapters 4 and 5, and their application to Egypt (chapter 10) are summarised and some conclusions drawn.

11.2 STRUCTURAL CHANGE TOWARDS SERVICES

11.2.1 International Evidence

Chapter 2 examined the hypotheses that there were uniform patterns of structural change across developed and less developed countries. Previous studies had suggested that while industrial and agricultural sector shares of employment tend to rise and fall respectively, in similar patterns across countries as per capita income increases this is less true for service sectors. Recent evidence has also identified a decline in industrial sectors in many developed countries accompanied by a rise in services, including government services. If this phenomenon is widely experienced among developed countries it implies that the forms of equations previously used to test for cross-section patterns of structural change involving services may mistakenly fail to identify common patterns across countries. Chapter 2 proposed alternative functional forms which could capture the effects of 'de-industrialisation' in developed countries. If the pattern of service and industrial employment shares rising together in the early stages of development but the service share increasing at the expense of the industrial share in later stages of development is a general one, the proposed functional forms could be expected to provide a good fit to the data.

Evidence from an international sample for 1960 and 1970 provided strong support for the view that uniform patterns of the sort described above exist for the sectoral employment shares. Two caveats to this general conclusion however also seemed warranted. Firstly tests for uniform patterns ~~was~~ were performed on 1960 and 1970 data separately and these indicated that there was more divergence from the predicted patterns in 1970 than in 1960. It would appear therefore that factors

affecting employment shares which are specific to particular countries were more prominent in 1970 than 1960. The reasons for this have not been investigated in detail though two possibilities suggest themselves. Although the greater divergence in 1970 than 1960 appears to occur both for developed and developing countries the reasons are probably different for each group.

Firstly in developing countries, some have experienced considerable increases in 'informal' urban services (mainly those countries with high population growth and migration rates) while others have not. Substantial increases in 'informal' activities in these countries began during the 1960s and this may partly account for the divergence among developing countries.

Secondly, for developed countries the phenomenon of de-industrialisation was not as widespread by 1970 as it has subsequently become.[1] Thus the 1970 evidence may represent a 'snapshot' of a transition period in which some countries' industrial sectors are still expanding while others have already begun to decline. In cross-section evidence a temporary divergence between developed countries in their patterns of structural change would therefore be observed.

A second caveat to the general conclusion of uniform cross-country patterns concerns the particularly large values of, and increases in, the service employment share in some Latin American countries, mainly Brazil, Peru, Mexico and Argentina. The evidence of large increases in the social service employment shares in chapter 2, and from Berry (1978) points to the possibility that in these 'middle-income' countries early expansion of government services has occurred. This seems to be partly in response to an excess supply of educated manpower which the government then employs.

The results in chapter 2 suggest some further properties to the cross-country patterns. Firstly service employment appears to expand relative to industry in the early and late stages of development with industrial employment expanding most in the 'middle' phase. Secondly within the service sector, social services follow a similar pattern - expanding relative to other services in the early and late stages of development. It seems likely that this important 'early' role for social services, while it is true for LDCs today, was probably less true for the developed countries in the early stages of their development. It is often the post-colonial legacy of large government bureaucracies and government objectives of universal education for their populations in many LDCs today which accounts for their relatively large share of employment in social services. These factors were not generally present in developed countries' early development.

Finally the evidence in chapter 2 was mainly concerned with cross-section patterns and although some evidence of changes within countries over time was considered, time-series patterns were not rigorously investigated. The limited time-series evidence that was examined was generally consistent with the cross-section evidence but it must be stressed that predictions of structural changes over time, based on cross-country evidence must be made with caution. The evidence considered in chapter 2, in common with previous studies,[2] suggests that while broad indications of <u>long-run</u> changes through time may be obtained from cross-section evidence, these international patterns do shift over time. Until longer-term time-series data are available for LDCs it would therefore be unwise to predict that as they develop they will necessarily follow the cross-section patterns observed. Indeed the growth of some services (such as 'informal' services) are peculiar to LDCs and it is still unclear how their share in employment will change as per capita incomes rise.

11.2.2 Egyptian Evidence

Evidence on sector employment shares in Egypt was examined in chapter 6. This indicated that the service sector's employment share during the period under investigation (1960-75) was substantially above that predicted from the international sample, and had been since at least the 1930s. In addition during 1960-75 the share of services in employment appeared to be increasing relative to industrial and agricultural employment. This relative growth in services was occuring both in social and some commercial services. Within the social service category, Government Administration and Education services displayed especially rapid employment growth. Although Defence services are excluded from employment data, government expenditure data examined in chapter 9 suggested that these services also expanded rapidly over the period, as would be expected given the military situation at the time.

Chapter 7 examined the role of income elasticity differences, wage rate differences and productivity growth differences between sectors as explanations of relative service employment growth. Due to data and methodological limitations conclusions on these explanations must be tentative but it did seem that income elasticity differences between sectors were unlikely to explain the observed employment differences. There was some evidence (though it could not be considered strong) that employment in different sectors did respond to changes in wage rates, but differential responses across sectors could not be confirmed. The evidence of Berger (1954) also suggested that at least in government administration services relative wage rates were not a strong influence on the decision to seek employment in that sector.

Differences in the rates of productivity growth across Sectors were considered in chapter 8. These appeared to be variable both across service sub-sectors and across different time periods and there was certainly no general evidence of slower productivity growth in services. Examining sectoral differences in productivity growth did however provide clues to some of the influences on relative service employment growth. Two factors were identified in particular. Firstly government education and employment policies have resulted in distortions in the skill composition of the labour force with an excess supply of educated manpower, especially university graduates from Arts faculties. To prevent unemployment the government regularly absorbed this surplus into its public service sector.

Secondly, high rates of population growth and rural to urban migration swelled the number of urban job seekers during the 1960s and 1970s.[3] At the same time indecision in the implementation of Egypt's five-year plans and a lack of direction in the publicly-owned manufacturing sector caused the demand for labour to grow particularly slowly in a large part of the goods-producing sector after 1965. Much of the surplus urban labour therefore found its way into privately-owned informal services. However it would be wrong to regard the growth of informal services as entirely supply-determined, due to inadequate growth in other sectors of the economy. Undoubtedly the growth in the low income urban population, mainly resulting from migration (during this and earlier periods) has created an increasing demand for some informal services, especially in the retailing and transport sectors.

Finally, given the factors responsible for Egypt's relative growth in service employment, what are the prospects of this continuing? It may be noted that the surplus of urban job seekers has been partially reduced in the early 1980s by the increase in international

migration of labour from Egypt to other Middle Eastern states. The rapid development efforts of various Gulf states in the late 1970s and early 1980s has, according to Hansen and Radwan (1982) removed some surplus labour and even created shortages of some types of labour. However workers who have left Egypt have largely been educated and skilled and this has removed from the Egyptian labour market those workers, such as engineers, who were already in fairly short supply. In addition the large amounts of unskilled labour available to the informal services sector have probably not been significantly affected. Nevertheless some of Egypt's surplus educated manpower which in the 1960s and early 1970s ended up in government services, has been removed by the labour demands of other countries. Should this foreign labour demand slacken (and it already seems in the 1980s that it may be), then with high population growth rates and rural-urban migration continuing, urban surplus labour will no doubt grow once again. In the absence of government policy changes, private services could be expected to continue their relative growth.

There are however signs that government policy changes could reduce both public and private service employment growth. Firstly the guarantee of a public sector job to graduates was removed in 1978 which, even if jobs are in practice often offered to graduates, may encourage graduates to make greater efforts to find jobs elsewhere. Secondly Hansen and Radwan (1982) have argued that the government has recently allowed public sector real wage rates to fall which may discourage employment growth in government services. However, the evidence discussed in Part 3 indicates that fairly large real wage falls may be necessary before significant disincentive effects operate. Given uncertainties surrounding international factors and future government policies towards the labour market it is difficult to

predict future structural changes. However it does seem that it will be difficult to reverse the processes which caused a relative growth in service employment during 1960-75, and structural change towards services can probably be expected to continue in the short-term.

11.3 NON-MARKET SECTOR GROWTH

Building on the work of Johnston (1975) and Bacon and Eltis (1976) chapter 3 suggested a framework in which differences in the rates of growth of market and non-market sector employment could be compared across countries. In particular it was desired to examine the extent to which different countries' macroeconomic performance varied with expansion of the non-market sector. The macroeconomic variables considered were per capita consumption growth, investment growth and the balance of payments.

It was shown in chapter 3 that, ex post, the faster the rate of total employment growth relative to marketed output growth the slower must be combined growth in per capita consumption, investment and the balance of payments surplus. Two particular effects of growth in non-market sector employment may however be identified. Firstly, while growth in employment in the market sector may be expected, via the production function relationship, to raise marketed output, growth in non-market sector employment creates demand for marketed output, but does not directly contribute to their current supply. Multiplier effects may indeed encourage faster marketed output growth but, as Johnston has argued, it is likely that some excess demand for marketed output will be created, requiring market sector productivity to rise, or causing inflation.

Secondly, Bacon and Eltis have argued that if non-market sector growth is financed by taxation, unless tax payers are willing to accept reductions in disposable income, the effect may be to generate inflationary pressures. If wage earners are taxed and succeed in raising money wages to maintain real consumption, investment and the balance of payment can be expected to suffer.

It was therefore of particular interest to examine in chapter 3 non-market employment growth relative to marketed output growth which might be expected to particularly adversely affect macroeconomic performance. Empirical evidence from a sample of 27 developed and less developed countries (considering growth rates over the period 1960-1970) suggested that many LDCs in particular experienced high rates of growth of marketed output, total and non-market employment. It did not seem to be the case however that either developed or less developed countries as a group experienced greater constraints in aggregate on the macroeconomic variables considered. This constraint appeared to be greatest for the United States, the U.K. and Egypt, all countries in which previous studies had suggested non-market growth may have had serious adverse effects. It was also found that for a given rate of market sector productivity growth, employment in non-market sectors was expanding especially rapidly (relative to marketed output) in LDCs. This confirms the suggestion in chapter 2 that social service employment has expanded rapidly in many LDCs, but has occurred prior to, or without, commensurate increases in marketed output.

Chapter 9 examined the role of non-market sector growth in Egypt during 1960-75. It was shown that the share of marketed output going to the non-market sector, g_m, rose considerably over the period. Movements in this share were generally mirrored by inverse movements in the proportion of marketed output available for consumption by those in the market sector, c_m. It was also argued that in Egypt market

sector productivity growth was a positive function of investment in that sector and that a reallocation of resources from government consumption to market sector investment could have had significant effects on marketed output growth.

It was noted above that non-market sector expansion could be expected to increase inflationary pressures. Bacon and Eltis argued that reductions in market sector workers' share of marketed output particularly could stimulate inflation. The hypothesis that reductions in the proportion of marketed output consumed by the market sector, c_m, would increase inflation was therefore tested, and found to significantly affect the inflation rate.

In examining the relationship between market and non-market sectors it has been stressed that the methodology adopted does not investigate causal relationships between variables. The 'Bacon and Eltis identity' (given in equation 9.11[4]) obviously expresses the ex post relationship between the sector shares in marketed output and observed changes in these shares may be the outcome of a number of complex, inter-related changes in the various variables. Chrystal (1983) has summed up the approach as follows:

> 'The Bacon and Eltis taxonomy undoubtedly provides an interesting framework within which to view the economy. However their methodology at best establishes correlations but not causation'. (p. 139).

While this may be accepted, it should not prevent consideration of the likely causal mechanisms inherent in the observed correlations. It must therefore be on the basis of a priori reasoning that the direction of causality between variables in the identity may be established. Thus for example it has been argued that a 'crowding out' effect of an increase in g_m is more likely when the economy is fully employed than when unemployed resources exist. In Egypt's case it was argued

that government control of a large proportion of production and the planning policy it has followed make it more plausible that an increasing share of marketed output consumed and invested by government has in part caused the reduction in resources available to other sectors. However it is clear that more theoretical and empirical work on the relationships between market and non-market sectors is necessary in order to clarify some of the issues of causation. It may also be noted that not only does the extent of the resource shift from market to non-market sectors vary across countries, (as evidenced in chapter 3) but the causal mechanisms may similarly vary. It is important therefore that individual country studies are carried out before conclusions are drawn on the nature of market/non-market sector relationships in particular countries.

Finally the results obtained in chapter 3 indicate that high rates of growth of non-market sector employment (relative to market sector output and employment growth) are common to many countries. The required increase in government expenditure to enable this growth must be financed by taxation and/or government borrowing. The ability to finance these expenditure increases must be important for their continuation and this study has therefore examined the prospects for tax revenue growth. These are summarised below.

11.4 TAX REVENUE GROWTH

In order to examine how tax revenues can be expected to change as per capita income rises, chapter 4 investigated the built-in flexibility properties of a progressive income tax using a model which could approximate many actual systems in use. In chapter 5 this was integrated into a wider fiscal model which enabled examination of the built-in flexibility properties of a number of commonly used, inter-related taxes. In both chapters elements of the U.K. tax system were

approximated. However since many countries operate broadly similar systems (which vary primarily in the way taxes are levied and in the nature of the interdependencies between taxes) it was argued that the model could be adapted to examine other tax systems. Although the model could not be applied directly to Egyptian data, in chapter 10 it was shown that it could be used to identify certain flexibility properties of the Egyptian tax system.

In chapter 4 a non-linear income tax structure was used in conjunction with a lognormal distribution of income, to obtain schedules for effective average and marginal tax rates and elasticities, as per capita income increases. As may be expected effective average and marginal rates were found to rise with income increases. However the effective average rate schedule was sigmoid in shape, rising steeply at relatively low average income levels, but becoming fairly 'flat' at high average incomes. The revenue elasticity which declined as average income increased, also appeared to become almost constant at higher average incomes.

Examining the built-in flexibility of the tax/transfer model in chapter 5, it was clear that this was a function of different forms of tax threshold indexation and the rates of inflation and real earnings growth. Effective average tax rate (EAR) results were presented for an inflation rate of 5% and real earnings growth of 2%. Obviously the values of EARs at each average income level are sensitive to the rates of inflation and earnings growth. However this did not appear to affect the general properties of the EAR schedules.

The results obtained suggested that although the built-in flexibility of all taxes was removed in the extreme case of all tax/transfer thresholds indexed to nominal earnings, in the more likely cases of threshold indexation equal to or less than the rate of price increases, significant flexibility remains. Effective average rates of

income tax for example rose significantly as average income increased, especially when compared with other tax revenue schedules. National Insurance EAR schedules displayed little (though slightly downward) built-in flexibility as may be expected from their slight regressivity.

VAT revenue possesses little flexibility due to its structure, but effective average rates were found to fall slightly in most cases, due to the effects of income tax and transfers on the VAT tax base - expenditure. The effective average transfer was also observed to decrease as average income increased, in most cases. Indeed it seemed likely that unless transfer payments were linked to nominal earnings they would be expected to become less generous. In the U.K. system where some individuals both pay tax and receive benefits, transfers were found to be sensitive to income tax indexation. It was also found that the relationship between the level of benefits paid, b, and the gross income level below which benefits are payable, y_B, varied according to income tax rate and threshold changes.

Finally changes in tax rates were also considered in chapter 5. It was shown that increases in the standard rate of income tax and NI rate substantially increased income tax and NI revenue per person, but also slightly reduced VAT revenue and transfer payments. The relationships between these tax rates and revenues were found to be linear while the relationship between the VAT rate and VAT revenue was found to be slightly non-linear reflecting the non-linearity in the relationship between expenditure and VAT payments as shown in Figure 5.1.

Tax revenue growth in Egypt was examined in chapter 10. The Egyptian tax system is similar to that in many LDCs, and unlike most developed countries, in that international trade taxes form a large proportion of total tax revenue. In Egypt they accounted for 35-50% over the 1960-78 period. However, excluding trade taxes (mainly import duties) it appears that taxes on incomes (including profit income) are

as important a revenue source as indirect taxes. These indirect taxes take two main forms; specific 'consumption' duties levied on particular items, and 'price differentials' on selected items whereby the government sets ex-factory and wholesale prices with the difference accruing to the tax authorities.

It was argued in chapter 10 that though some aspects of the tax/transfer model are not applicable to Egypt's tax system there are similarities between both structures and some of the model's results are relevant to the Egyptian case. Firstly empirical evidence on income distribution in Egypt appears to be broadly consistent with the use of the lognormal income distribution in the model.

Secondly while the administration of income tax in Egypt is complex, nevertheless the overall progressive structure of Egypt's income taxes is similar to that included in the tax/transfer model. The results of the tax/transfer model therefore suggested that Egypt's income tax possesses substantial built-in flexibility while little flexibility could be expected in the social insurance tax. In fact because of discretionary changes and tax evasion actual flexibility appears to have been slight for most of the period considered.

The Egyptian government has considered the adoption of a general sales tax which would probably resemble the VAT system used in the model. Should such a tax be introduced the results in chapter 5 suggest that unless the tax was structured in a progressive or regressive manner (for example by varying rates across types of goods) it could not be expected to possess significant built-in flexibility. However, changes in the income or social insurance tax schemes or transfer system could influence revenue growth from the sales tax. The present system of indirect taxes in Egypt ~~are~~ is probably fairly neutral or slightly regressive suggesting that with the existing system also there is

unlikely to be large revenue changes as a proportion of average income as incomes grow.

These results allow some general observations on the growth of tax revenues during development. Firstly it would seem that at higher average income levels (that is, those relevant to developed countries) the capacity of the tax system to generate automatic increases in tax revenue is particularly limited. The growth of net revenue, which is mainly affected by income tax revenue growth, was shown in chapter 5 (see Figure 5.6) to be increasing relative to average income but at a diminishing rate, as average income rises. At higher average income levels the profiles are fairly 'flat' compared to lower income levels. This is of particular concern from the point of view of funding government expenditure increases since evidence in chapter 2 suggests that a relative growth in publicly-provided services is particularly rapid in developed countries. If automatic revenue increases are less, then for a given increase in expenditure relative to average income, greater reliance on tax rate changes or other adjustments to the tax structure is required, or greater use of borrowing. This last alternative may of course simply widen the gap between expenditure and tax revenue at higher average income levels (if incomes grow over time).

Secondly National Insurance and VAT cannot be relied upon to produce significant revenue increases as average income increases. Indeed it would seem that the slight regressivity of NI is most likely to reduce effective average rates of NI, while VAT revenue is also likely to decrease (relative to average income) due to the progressivity of income tax. However compared to income tax effective average rates of NI and VAT change very little under plausible indexation assumptions, as average income increases. In addition to obtain any increase in EARs

of VAT it was found to be necessary to index income tax thresholds such that income tax EAR schedules became horizontal.

Thirdly income growth, as may be expected is in general associated with a declining share of resources devoted to transfer payments as fewer individuals remain eligible. However the form of indexation of benefits is important for changes in the 'effective average transfer', T/y. Indexation at the rate of growth of earnings will, if real earnings growth is positive, cause $T/\bar{y}$ to rise as average income rises, so increasing the burden of financing transfer payments. Keeping real benefits constant however does allow the financing burden to decline with income growth.

It is also interesting to note that in the U.K. the National Insurance scheme is not 'self-financing'. That is, total contributions are not expected to cover the total cost of transfers (unemployment benefit, pensions etc.) paid from the fund, nor are contribution rates necessarily changed in line with changes in payments. Nevertheless the results in chapter 5 indicate that financing certain transfers from National Insurance could become more difficult as incomes grow, since earnings indexation of benefits raises $T/\bar{y}$, while price indexation of NI thresholds reduces $R_c/\bar{y}$. This combination of indexations could certainly occur in practice although in the U.K. benefit levels have not typically increased in line with nominal earnings.

Finally the analysis in chapter 5 suggested that the relationship between average income levels, benefit levels and the income level determining eligibility for transfers needs careful consideration. Studies of the effects of the relative returns to working and not working on incentives have often examined the relationship between benefit levels and income from employment. However the level of income below which benefits are paid may also be critical for incentives to supply labour. The results of the tax/transfer model

suggested that, depending on the form of threshold indexation, these two variables - the benefit level and the income level below which benefits are paid - may not move uniformly relative to average income as incomes grow. Where this occurs it may be for example that although a 'benefit/earnings' ratio remains fairly constant, more individuals are becoming eligible for transfers with consequent effects on incentives.

However the observation of most concern is perhaps that in developed countries the prospects for automatic increases in tax revenues relative to average income ~~is~~ are becoming increasingly limited. Conversely of course, if less developed countries can overcome problems of tax evasion, progressive income taxes offer large rises in tax revenue as development proceeds.

Footnotes

1. The more widespread decline in industrial employment shares may partly be due to the shorter-term effects of the post-1973 and post-1979 recessions and may not therefore represent evidence of a permanent shift away from industry.

2. See, for example, Chenery and Syrquin (1975), Chenery (1979). Chenery and Syraquin found small but significant shifts over time in their cross-section relationships between per capita income and sector output shares. They attribute this mainly to technological changes taking place over time. See Chenery and Syrquin (1975, pp. 32-42).

3. As Hansen and Radwan (1982) indicate, this plentious supply of labour to urban areas was to some extent reduced in the later 1970s as emigration to other middle-eastern states mainly in the Gulf increased in the wake of the 1973-4 oil price rises.

4. The identity used by Bacon and Eltis is decomposed slightly differently from that given in 9.11. See Bacon and Eltis (1976, p. 123).

CHAPTER 12

FUTURE RESEARCH

12.1 INTRODUCTION

Earlier chapters of this thesis have examined some aspects of the process of structural change towards service industries, in an international context and in the Egyptian economy. Particular attention was devoted to the growth of the public service or non-market sector and to the increase in tax revenues to fund such growth. It is often the case when undertaking research to answer certain questions that further questions are thrown up in the process which necessitate further investigation. This is certainly the case with this study and in this chapter, some of these questions are briefly considered and suggestions made on the possible directions of future research.

It has been argued earlier that to understand the influences on, and effects of, the process of structural change towards services it may be necessary to examine the growth of public and private, or market and non-market sectors separately and consider the nature of the linkages between them. This thesis has not however been concerned primarily with the causes of structural changes. Rather it has examined patterns of structural change, some implications of non-market sector growth, and profiles or 'patterns' of tax revenue growth. In the Egyptian case study it was desired to establish factors causing service sector employment growth but since Egypt was shown to be a fairly extreme example of this phenomenon, it could not be presumed to indicate causal factors elsewhere. In addition some causal mechanisms alleged to have widespread relevance (such as income elasticities) did not in general find support in Egypt.

It is however the causal mechanisms behind structural change and public sector growth which have proved most intractable, but which would seem most to require illucidation if understanding of the processes at work is to be advanced. Research is needed in three areas in particular - (i) causes of the growth of marketed services especially in the early stages of development/in LDCs, and in the 'post-industrial' phase;

(ii) causes of public expenditure growth during development; and (iii) the causal mechanisms between market and non-market sectors. The current state of knowledge in these three areas is unsatisfactory and in some cases has received little attention in recent years. Suggestions for future research in each of these areas are offered in turn below.

12.2 MARKETED SERVICES GROWTH

Hitherto research on structural change during development which has examined service sectors has usually considered an 'aggregate' services sector. A lack of concensus on the patterns of, and factors affecting, service sector growth has often been attributed to the varied nature of economic activities in this sector, and problems of output measurement. In Part 2 it was argued that patterns of structural change towards services in general, can be discerned, but that it is important to examine marketed and non-marketed services separately. Not only may factors affecting both these services be expected to differ because one is open to market forces in ways the other is not, but also methodological problems may be overcome. Output measurement problems, for example, are largely confined to the non-market sector. Thus explanations of structural change towards marketed services which employ output variables may be regarded as methodologically satisfactory. For non-marketed services however inclusion of output variables requires strong qualifications or assumptions which are difficult to verify. Thus while patterns of service sector growth may be examined for 'aggregate' services, the evidence in chapter 2 suggests that patterns may well differ significantly between marketed and non-marketed services. This, together with *a priori* reasoning suggests that in pursuit of an explanation of service sector growth, these sub-sectors should be considered separately. This, of course, does not deny the possibility of both sectors sharing some causal factors.

It has been argued by Chenery and Syrquin (1975) and others that fundamental to the process of structural change is a transition from 'underdeveloped' to 'developed' and hence less developed and developed countries are not characterised by different structural relations. Their evidence and that of chapter 2 of this thesis lend support to that view. However in seeking to explain these patterns of structural change it does seem likely that the importance of various factors will differ between less developed and developed countries. Factors such as differences in income elasticities and differences in productivity growth have been found to explain, in part at least, the growth in some marketed services in developed countries. It is less likely that these factors can explain service sector growth in LDCs in quite the same way. This was certainly found to be the case for Egypt. Factors which might be expected to be important influences on service sector growth in LDCs, but which are not generally likely to be important in developed countries could include the following:

(i) The rate of population growth - Faster population growth could be expected, under certain conditions, to increase the growth of the service sector, through two mechanisms. Firstly higher population growth rates are often associated with lower per capita income growth rates. Ceteris paribus this creates more underutilisation of labour and poverty. These conditions appear to be catalysts for the growth of an informal sector, often service-orientated. The informal service sector with minimal capital and skill requirements may provide the opportunity for the unemployed or underemployed to create economic activity, mainly consumed by low income earners. Secondly, the surplus labour created by higher population growth often results in increased rural-urban migration. This 'urbanisation' effect further generates the informal services discussed above, demand for which exists particularly in geographically concentrated conditions.[1]

(ii) The rate of growth of industry - At first sight it may appear tautological to argue that structural change towards services is a function of the growth of industry. This is not the case however. What is suggested is that the growth rate of service activities may be determined by the growth rate of the industrial sector. Thus for a given population growth rate and supply of urban labour as discussed above, faster growth in industry increases industrial employment and reduces those largely supply-determined services. In addition however industrial growth gives rise to demands for increases in some 'modern' distribution and retailing services. It is difficult to predict the effect of this on the share of resources in services but a relative movement from 'traditional' to 'modern' services could be expected.

(iii) Government planning and poverty policies - In countries in which governments take an active role in planning development and seek to reduce poverty, more infrastructure services may be expected in the early stages of development. Public utility services (electricity, gas, water) particularly are often marketed, but where produced under public-ownership (or encouraged in development plans) grow more rapidly than when the government does not seek to influence the market mechanism.

(iv) Income distribution - A less equal and/or worsening income distribution may be argued to encourage the growth of services in particular. Firstly, for a given level of income, a more unequal distribution may give rise to greater demands for modern services (such as banking, insurance etc.) by those with high incomes. This could occur through the Clark/Fisher mechanism of higher income elasticities for services. Secondly the more unequal distribution may create more 'traditional' services by, for example, increasing those services demanded by the poor and the traditional services such as domestic service demanded by the rich.

It is interesting to compare the evidence in chapter 2 on the size of the service sector in developing countries and income distribution statistics. Latin American countries such as Brazil, Mexico, Peru and, from Berry (1978) Columbia, together with Phillipines and Tunisia were found to have relatively large shares of employment in services. These are all countries with relatively high inequality (Gini coefficients > 0.5) while Pakistan and Yugoslavia were shown to have relatively small service sectors but have relatively low income inequality (Gini coefficients < 0.4)[2]. This very partial evidence does suggest that income distribution may have some effects on the sectoral distribution of resources, and warrants further investigation.

It may be noted that the variables in (i) to (iv) above indicate that dynamic rather than static forces may have most influence on patterns of structural change. Examination of structural change patterns has tended to associate sectoral allocation with static variables such as income levels and population size. However since structural change is itself a dynamic process it may be expected that a dynamic explanation is required. This in turn suggests that the most fruitful results may be obtained from time-series analyses in various countries rather than cross-section studies.

Finally it seems that future research on the causes of service sector growth will have to devote more attention to the difference between statistical changes and behavioural changes. Some of the evidence on the alleged causes of relative service growth (such as income elasticities) has been challenged on the grounds that the statistics do not reveal any actual changes in the type of economic activity undertaken. Thus, for example, it is suggested that some evidence of increases in distribution services employment simply reflects the phenomenon of vertical disintegration in industry. Manufacturing firms which when relatively small may distribute their own products (and all their employees are

categorised as 'manufacturing'), when they become larger may prefer to contract out distribution services to specialist firms. When this occurs employees engaged in distribution which previously appeared in 'manufacturing' statistics now appear in 'distribution service' statistics. There is however little information on vertical integration and disintegration processes during development, yet these may give rise to spurious statistical changes. It is important for these statistical problems to be sorted out (by, for example, assessing their quantitative significance) before seeking behavioural explanations of service sector growth.

12.3 PUBLIC EXPENDITURE GROWTH

There is at present little information on, or investigation of, the causes of non-market sector growth per se. However there is a long history of attempts to explain public expenditure growth, of which the non-market sector forms a large part. Most theories of public expenditure growth may be categorised as either microeconomic or macroeconomic. The microeconomic approach has sought to explain expenditure growth by examining separately the determinants of the demand for, and supply of, particular government services.[3] An important contribution of this approach has been its emphasis on the need to separate certain types of expenditure for analytical purposes, such as expenditure on goods/services, and transfer expenditures.[4] However although this approach can help to explain why some public expenditures grow, it does not seem to explain satisfactorily a relative growth in the public sector. Thus predictions for an expenditure/GDP ratio are sometimes ambiguous. It is however the observed relative growth of the public sector in various countries and at different times which has created most interest among economists, and for which explanations are sought.

By contrast the macroeconomic approach to expenditure growth has usually been concerned with a relative growth. Macro theories take essentially three forms. Firstly variations on 'Wagner's Law' which predicts an expanding public sector during development primarily as a result of higher income elasticities and increased requirements for social provisions associated with industrialisation and urbanisation.[5] Secondly the Peacock and Wiseman (1961) analysis of public expenditure growth attributes expansion to 'social upheavals' such as wars, which increase the demands for publicly-provided goods and services and the acceptable levels of taxation, in discrete 'jumps'. Thus public expenditure/GDP ratios rise during crises but remain at a stable and higher level thereafter. Thirdly there are 'political' models of expenditure growth such as those associated with Niskanen (1971) and Frey and Schneider (1978). These have argued that expenditure grows as a result of the political/bureaucratic decision-making process.

Each of these approaches seems to fail as an explanation of non-market sector growth during development, though each may contribute to an understanding. The Niskamen and Frey/Schneider approaches for example can account for 'overproduction' of non-marketed services, but they cannot explain why this process occurs across vastly different political regimes and appears to be especially strong at certain stages of development. Greater understanding of the causes of the relative expansion of the non-market sector may be best achieved through a macroeconomic approach which incorporates the demand and supply aspects utilised in the microeconomic studies. It is useful to categorise causal factors into three types: 'built-in flexibility' factors, demand-induced factors, and supply-induced factors.

Built-in flexibility factors - Governments frequently make financial commitments involving expenditure in future years, and may have only limited control on the factors governing the value of that

future expenditure. This applies particularly to transfer expenditures. In many countries governments commit themselves to the provision of old-age pensions, social security payments, unemployment compensation and so on. These may be indexed in some form to price or wage increases and governments may have little or no control over the numbers of individuals eligible to receive payment. Thus an increasing age structure of the population or a long term rise in unemployment automatically increases these transfer expenditures. The analysis of transfer payments flexibility in chapter 5 suggested the likelihood of a decline in the transfer expenditure/mean income ratio in certain circumstances but of course this did not account for automatic increases due to increased participation in the benefit schemes. Transfers accounted for about 20% of public expenditure in the U.K. in 1980 suggesting that any built-in flexibility in these expenditures could be significant overall.

Debt interest (accounting for about 10% of U.K. public expenditure in 1980) also represents a 'built-in' commitment on public expenditure. The extent of borrowing to fund past levels of expenditure is obviously an important determinant of current debt repayments. Thus to the extent that governments have incurred deficits in the past (which may be linked to tax flexibility), governments are committed to increased public expenditure. Whether expenditure/income ratios rise will be dependent on how fast incomes rise over time and the effect of interest rates on the value of repayments. It seems entirely plausible however that debt interest/mean income ratios could rise with increases in incomes and this can be fairly readily investigated.

Demand-induced factors - In earlier chapters the arguments for relative increases in the resources devoted to certain services being induced by demand shifts were considered. It seems probable (though difficult to test) that the elasticity of demand for some non-marketed

services does increase with income. Education and health services (or parts of) could come into this category. In countries where these services are marketed (e.g. U.S.A) some relative increases in demand as incomes rise have been found. In countries such as the U.K. where these services are non-marketed, if governments respond to increases in demand this will be evidenced in rising public expenditure. Indeed the absence of a market price for these services may encourage greater increases in demand than occurs when they are marketed.

Secondly increased demand for non-market services may arise from changes in the composition of consumption of private goods and services. Thus, for example, if rises in per capita income are associated with increases in time devoted to leisure pursuits which require complementary non-market services, public expenditure may increase. Similarly changes in consumption patterns may require more publicly-provided complements. Increased purchase of cars and travel for example may result from high income elasticities and increased leisure, which may give rise to demands for increased public spending on roads. The possibility of marketed and non-marketed goods and services substituting for, or complementing, each other has received little research attention but may have important implications for non-market sector expansion.

Supply-induced factors - The existing literature on public expenditure growth has identified at least two channels through which supply may affect observed public expenditure. Peacock and Wiseman's 'tolerable burden of taxation' concept suggests that governments' capacity to meet demand for non-market services may be limited by the extent to which taxes can be raised to fund such expenditures. Thus observed increases in expenditure may be supply-determined and coexists with excess demand. The analysis in chapters 4 and 5 is again relevant here. If automatic increases in effective average rates of tax diminishes as

incomes rise, governments may have to rely on discretionary tax parameter changes (such as tax rates) which can meet more political resistance. More importantly where significant automatic increases in tax revenue occur this is perhaps more likely to encourage expansion of expenditure than reductions in the tax burden.

Chapters 4 and 5 attempted to give some indication of how tax revenue could be expected to increase with rises in incomes. Government expenditure is, of course, often funded in part by borrowing. To understand the total constraint on governments' ability to provide publicly-funded services therefore it is necessary to consider how the capacity to borrow may vary as incomes rise. It may be, for example, that if savings exhibit some tendency to rise as a proportion of income, as incomes rise, that government may be able to channel some of these savings towards government debt and hence increase their borrowing capacity.

A second mechanism by which supply factors may determine public expenditure growth is through 'over-supply' rather than 'under-supply'. This is the basis of the Niskamen model whereby the bureaucratic decision-making process leads to excess provision of 'bureaus'. This theory undoubtedly does help to explain the growth of some public expenditure. However it should be noted that growth in administration services by governments which do not appear to be 'demanded' may in fact represent a necessary complementary expansion to growth in some other government services which is demanded. Thus for example there may be demand for increased education services from consumers who are unaware that provision requires complementary increases in administration services. If these two items are separated in public budgets the 'true' cost of meeting demand for increased education may not be appreciated.

This approach to determining the causes of the growth of public expenditure would seem to be the most fruitful and should thereby provide a better explanation of growth in the non-market sector. Such an explanation is likely to be important also in furthering understanding of the interdependencies between the market and non-market sectors. This is considered further below.

12.4 MARKET AND NON-MARKET SECTORS

Fundamental to the Bacon and Eltis explanation of Britain's macroeconomic ills during the 1960s and 1970s was the argument that expansion of the non-market sector had substituted for expansion in the market sector. There was therefore some 'crowding out' of the market sector by the non-market sector. Their analysis has however been criticised on the grounds that the use of an identity (as discussed in chapters 3 and 9) does not allow conclusions on the behavioural mechanisms at work. For this reason they (and earlier chapters of this thesis) have stressed that the identity is an ex post relationship which identifies the effects on certain variables in the economy if government expenditure on the non-market sector is allowed to increase more rapidly than output from the market sector. Where this occurs it may simply result from the fact that the determinants of government expenditure and market sector growth are different and there is therefore no reason to expect both to grow at the same rate. However a relative growth in the non-market sector is easier to explain if it can be established that growth in the non-market sector actually constrains the growth of the market sector. While mechanisms which may act in this way have been suggested, as yet there has been little systematic examination of these at either the theoretical or empirical level. Future research should seek to fill this gap. Three elements to such an examination may be suggested.

Firstly, the multiplier effects of government and private expenditure may be different, and may have an effect even if there is no crowding out of investment, employment etc. in the market sector in the sense that the market sector would not otherwise have utilised these resources. Bacon and Eltis have argued for example that where governments invest heavily in 'prestige projects' the productivity of investment may be less than alternative investment in the market sector. The composition of government expenditure may therefore be important. In addition differences in the labour-intensity of production or wage rates between the two sectors may give rise to changes in consumer demand (and the resulting multiplier effects), if resources are transferred to the non-market sector.

Secondly the method of financing increases in the non-market sector may cause the effects on the market sector to vary. Taxation-financed expenditure by removing an equivalent amount of expenditure from the market sector may be expected to prevent excess demand effects.[6] However if the increased government expenditure is not 'demand-induced' this may simply result in inflation (as Bacon and Eltis have argued) and/or reductions in savings to maintain purchasing power. The effects of borrowing-financed expenditure on the market sector will of course depend on what market sector investment opportunities are foregone in preference for lending to government.

Thirdly, where increases in the non-market sector are associated with increases in government budget deficits economic theory has already established channels through which this may reduce market sector output growth. Although the relationships between budget deficits, growth and inflation remain contentious issues, this would seem to be one area where further research may establish causal links between non-market sector growth, inflation and constraints on market sector growth.

Much research has recently been undertaken on some of these issues and this may provide guidance on the specification of a more formal model to analyse the causal relationships between market and non-market sectors.

Finally, some of the research of this thesis, and this chapter in particular, indicates that in seeking to understand the processes of structural change and public sector growth, the causal mechanisms at work are the most difficult to identify, and verify. Economic theory and empirical evidence have frequently been unable to offer unambiguous guidance, yet it is undoubtedly in this area that progress needs to be made. This chapter has made some tentative suggestions concerning the most likely directions in which progress will be made which, it is hoped, will enable some conclusions to be reached on the causes and effects of structural change during development.

Footnotes

1. In urban areas for example workers may live further from their place of work than workers in rural areas, thus requiring more transport facilities. In conditions of low per capita income this will tend to lead to the purchase of transport 'services' rather than transport 'goods', such as privately-owned vehicles.

2. Income distribution evidence is given by Todaro (1981, pp. 128-9).

3. This approach is associated particularly with the two British economists, C. V. Brown and P. M. Jackson. For more detail see Brown and Jackson (1982, pp. 100-126).

4. This distinction is also incorporated in the 'macroeconomic' approach of Chrystal and Alt (1979).

5. Although it has often been assumed that Wagner's analysis implied a rising share of resources in the public sector, this view has been challenged. See Bird (1971), Chrystal and Alt (1979).

6. This will of course depend on how changes in tax levels affect consumption and savings patterns in addition to any work incentive effects.

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