PERFORMANCE INCENTIVES IN THE TAKAFUL INDUSTRY: AN EXPERIMENTAL INVESTIGATION

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ABSTRACT

Performance Incentives in the Takaful Industry: An Experimental Investigation

by

Wan Izyani Adilah Binti Wan-Mohamad

The takaful industry offers customers insurance products judged to be compliant with Islamic law, in return for payments into insurance funds managed and invested by a takaful company henceforth called the 'operator'. Contracts provide for a transfer of risk from policyholder to insurance fund, using a hybrid of two standard organisational forms: a) the stock insurance model, where the operator has control and ownership of residual funds, and b) the mutual insurance model, where policyholders enjoy control and ownership of residual funds. In the takaful industry, there is a complete separation of ownership of policyholder residual funds from their control, which rests solely with the operator. Policyholders are therefore in a classic principal-agent relationship with the operator, with obvious potential for agency costs. A case can therefore be made for regulation of the industry, to protect the interests of policyholders. One way to reduce agency costs is by appropriately designed monetary incentives to the operator. Policyholders are unable to act to control the operator's compensation or decisions. A regulator is therefore essential to act on their behalf, as they are not represented and not properly taken account of by shareholders. Three forms of Shariah-compliant compensation, in order to study economic incentives for the operator to efficiently perform three broad categories of tasks, involving decisions on the size of the pool of policyholders, on cost control, and on investment of technical reserve. The three forms are sales commission (wakalah), sharing of investment profit (mudarabah), and sharing of residual funds (ji'alah). All three forms can be observed in practice, sometimes in concert, though in some regulatory jurisdictions some of them have been prohibited or restricted. The aim of the study is to provide empirical evidence on the efficiency and equity of the takaful organisational form. A laboratory experimental approach is chosen for the research design in order to avoid problems of non-availability and endogeneity of data. The experimental subjects were students from Durham University, incentivised in accordance with the research design through money payment. The data is analysed using Statistical software for data science (STATA). The implications of our findings for regulators show that *only* ji'alah offers an efficiency gain to the agency as a whole, the evidence in favour of including wakalah in a hybrid contract is weak. And there is no clear evidence of 'gifts' being reciprocated by better alignment of operator decisions with the welfare of policyholders.

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DECLARATION

I hereby declare that no portion of the work that appears in this study has been used in support of an application of another degree in qualification to this or any other university or institutions of learning. Where information has been derived from other sources, I confirm that this has been indicated in the thesis. The work in the thesis is based on research carried out at the Department of Accounting, Durham University Business School, United Kingdom.

STATEMENT OF COPYRIGHT

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DEDICATION

TO MY DEAREST PARENTS:

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...for giving all the do'a, love, support and encouragement throughout the duration of my studies.

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DR. YUSUF KARBHARI
Reader in Accounting, Cardiff Business School

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CHAPTER 1

INTRODUCTION

1.1 Introduction

In the takaful (Islamic insurance) industry, there is complete separation of ownership from control. Policyholders have ownership of residual funds, as in the mutual insurance model, where policyholders enjoy control and ownership of residual funds, but no control, as in the stock insurance model, where the operator has control and ownership of residual funds. Hence, the control of residual funds rests solely with the operator.

Policyholders are in a classic principal-agent relationship with an operator, with obvious potential for agency costs. An agency is made up of a principal, and agent acting on behalf of the principal, in return for payment. Agency costs arise when the agent cannot costlessly be provided with incentives to act according to the preferences of the principal. There are also distributional concerns, because the operator sets its own compensation, subject to weak competitive pressures in the market. Mokhtar et al., (2015) report large variation prior to 2012 in the shares of residual funds extracted by Malaysian takaful companies. The range was 10% to 80%. Acting as regulator, the Bank of Negara Malaysia imposed an upper limit of 50% on this share, effective from 2012.

An economic case can therefore be made for regulation of the industry, to protect the interests of policyholders, the strongest case resting on the mitigation of agency costs. Policyholders are unable to act to control the operator’s compensation or decisions. A regulator is therefore essential to act on their behalf, as they are not represented and not properly taken account of by shareholders. One way to reduce agency costs is through appropriately designed monetary incentives to the operator, in the form of compensation. Other mechanisms for reducing agency costs include implicit incentives through career concerns, monitoring by boards of directors and other external parties, product-market competition, investor activism and takeovers (Tirole, 2006).

1.2 Problem Statement

Little attention has been paid to the efficiency of operator compensation as a means of reducing agency costs. The researcher is only aware of the work by Khan (2015a)[1]. He attempted to identify Pareto optimal operator compensation, using calculus to analyse a model of the principal-agent relationship between policyholders and the operator. To be more precise, Khan (2015a) does not produce the optimal compensation. Given three exogenous (possibly sub-optimal) Shariah-compliant compensation forms, he seeks the optimal mix.

As was pointed out above, Khan's model examines three forms of Shariah-compliant compensation, in order to study economic incentives for the operator to efficiently perform three broad categories of tasks. The three forms are sales commission (wakalah), sharing of investment profit (mudarabah), and sharing of residual funds (ji'alah). The multi-task nature of the operator's role raises the issue not only of the amount of effort supplied but also its distribution amongst the three tasks. Christensen & Feltham (2008) raise the possibility that multiple performance measures will be optimal in this setting, a potential rationale for employing three forms of compensation tied to different measures in order to incentivise the takaful operator to allocate the right amount and mix of effort amongst the three tasks. Given a single performance measure, an additional performance measure can be valuable if the first measure does not incentivise the right mix and/or the first measure is noisy, and the operator is risk averse (see Christensen & Feltham, 2008, p. 190).

Khan's (2015a) analysis suggests the optimal compensation package features wakalah and ji'alah. The model is relevant to market practice, where all three compensation forms can be observed, sometimes in concert, and to regulatory decisions, where in some jurisdictions some forms of compensation have been prohibited or restricted. In addition, Khan (2019) reports that ji'alah is offered in a minority of cases, and that the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) prohibits ji'alah. Meanwhile, wakalah is widely used to compensate operators and is permitted by most regulators (except Saudi Arabia, which mandates ji'alah and prohibits hybrids). Thus, there is a need for empirical evidence to guide regulators to act on behalf of takaful policyholders.

[1] See Khan et al., (2020) in their bibliometric review of takaful literature article.

However, Khan's (2015a) model suffers from weaknesses including:

1) the objective function does not accurately capture the welfare of policyholders
2) the model addresses an insignificant agency problem with negligible agency costs, due to excessive operator costs
3) the operator's decisions have no impact on the risks faced by the takaful fund, a feature that limits interest in the model's results

It has been noted that the model has not been subjected to detailed empirical testing (see Khan et al. (2020) for a bibliometric review of the theoretical and empirical takaful literature).

The empirical performance of hybrid contracts *in general* has been tested in Khan (2015b), with an additional focus on 'gift exchange'. Increased wakalah, and the presence of ji'alah, were found to be significantly positively related to the amount of insurance surplus. But this empirical study suffers from a number of problems. First, errors in variables where continuous ji'alah and mudarabah variables were proxied by dummy variables. A problem with errors in explanatory variables is they cause bias and inconsistency in all the estimators, even those connected to variables measured without error (see Johnston, 1984, p. 430).

Second is endogeneity where choice of compensation may depend upon insurance surplus performance. When there is endogeneity, a simultaneous equations model is appropriate, with the dependent and endogenous independent variables each providing an equation. Two-stage least squares rather than ordinary least squares, or the use of instrumental variables, is recommended to overcome biased estimation of coefficients.

Third, the impact of wakalah is interpreted as evidence of gift exchange, but the finding could be an artefact, resulting from deflation of expenses using sales revenue, and from not deflating insurance surplus. Without gift exchange, expenses should be non-decreasing in sales commission. However, the ratio of expense to sales revenue will fall if sales commission increases sales revenue. Undeflated insurance surplus will rise if sales revenue rises and the profit margin is positive. Having discussed that Khan's (2015a) model suffers from those three weaknesses, the following section addresses research aim, objective and research questions.

1.3 Research Aim, Objective and Research Questions

The aim of the study is to supply empirical evidence on the relative efficiencies of some common forms of agent compensation for the purpose of improving overall efficiency. In order to achieve the research aim, the research objective is to test a variant of the model in Khan (2015a), one which purports to find analytically the optimal form of agent compensation and their role in alleviating problems embedded in the principal-agent relationship. In order to achieve this objective, for the empirical work, this study was based on a theoretical model by Khan (2015a), which investigates the forms of compensation received by takaful operators and their role in alleviating problems embedded in the principal-agent relationship.

Khan (2015a) sets out an optimisation model for the agent, given a hybrid contract with wakalah, mudarabah and ji'alah elements. However, Khan's (2015a) model suffers from three weaknesses as discussed in Section 1.2. In Khan (2015b), which also tests for the existence of gift exchange, empirical evidence is supplied on the incentive properties of the hybrid contract, but the study suffers from poor field data, due to non-disclosure of the mudarabah and ji'alah percentages. All 174 observations from 30 takaful operators in the Gulf Cooperation Council, Pakistan and Malaysia for the years 2003-2011 only reported the wakalah fee charged to participants, plus the existence of some form of mudarabah and ji'alah arrangements. This lack of disclosure compelled Khan (2015b) to use indicator variables in his empirical analysis, reducing the efficiency of the results. He provides evidence that wakalah-ji'alah hybrids outperform any other hybrid and that mudarabah should not be offered in a hybrid contract. In addition, he also provides evidence in favour of the gift-exchange anomaly, whereby offering greater than necessary payments to the operator was reciprocated by better decision making than would have been predicted with a standard agency model.

With continued weak disclosure of field data (Bhatty, 2010; Kassim, 2013), empirical evidence on behavioural effects related to agency can be obtained using laboratory experiments. Experimental research designs provide the advantages of replicability and control (Davis & Holt, 1993; Friedman & Sunder, 1994). Nuisance variables can be held constant and research variables can be systematically varied, one at a time, to identify causal relationships. The present study offers empirical analysis using much finer data by switching from field data to experimental research.

Recognising the aim and objective of the study, the research questions to be achieved are derived from Khan (2015a) and (2015b):

(i) How do takaful operators respond to these different contractual forms or financial incentives?

(ii) Which combination of financial incentives is optimal?

(iii) Is there evidence that gift-exchange can improve decision making?

As such, in line with the research questions developed for this research, the study investigates in order to provide empirical evidence on the efficiency and equity of the takaful organisational form.

1.4 Research Methodology

Khan (2015a) overlooks a number of important elements in his optimal compensations model. This indicates a need to understand the efficiency of operator compensation as a means for the operator to efficiently perform three broad categories of tasks. The present study contributes to the scant evidence on incentives for takaful operators by reporting results from a laboratory experiment, designed to investigate the effect on decision making of different forms of compensation, in a multi-task setting involving decisions on the size of the pool of policyholders, on cost control, and on investment of technical reserve.

The greater control of data generation offered in a lab experiment means the errors in variables and endogeneity problems in Khan (2015b) are avoided. The drawbacks in Khan (2015a) are also avoided, by specifying an environment in which operator decisions affect the risk of the agency, and in which the agency problem is non-trivial. We should note that the differences in the experimental environment from Khan (2015a) mean the experiment is in the nature of a stress test[2] of the propositions in Khan (2015a).

[2] Look 'stress test' up in the index of Davis & Holt (1993). It is a test to find out whether propositions derived from a specific model are supported outside the environment assumed by the specific model.

In the present study, the researcher reports the effects of compensation arrangements[3] on:

1) Total amount of 'effort' supplied by the operator,
2) Mix of supplied 'effort' in a multi-task setting, and
3) Welfares of operator and policyholder

In summary, the laboratory experiment is used to supply data for empirical analysis, on the grounds of data availability and the facility for control to avoid questions of endogeneity.

1.5 Motivation, Rationale and Significance of the Research

Incentives alignment through takaful operator compensation arrangement is found to mitigate the agency problem. In takaful, the principals hire an operator to manage the business. Supposedly, the principals decide the compensation or incentive scheme should be given to the agent. However, in practice, the agent decides his compensation defined by an incentive contract. As takaful participants are not able to choose the incentives schemes; wakalah (a fixed upfront percentage), mudarabah (a share in investment profits) and ji'alah or surplus-sharing (a share in insurance surplus based on performance), there is a potential need for regulation to play a role in designing optimal incentive schemes. In order to achieve that objective, for the empirical work this study will adopt a theoretical model by Khan (2015a) by investigating the form of compensation received by takaful operators in alleviating problems embedded with the principal-agent relationship. As far as it is concerned, this model has not been subjected to any empirical testing which this study is going to do. In addition, this study examines the recent theme of gift-exchange theory in dealing with the provision of optimal incentives for agents where companies give employees a gift of a wage above the market-clearing level and employees reciprocate with a gift of effort above the enforceable level. Gift-exchange can be studied by comparing the effects of increasing wakalah on the components of gross profit with the prediction from agency theory in Khan (2015b).

It is obvious that there are very few studies that focus on the contractual arrangements and indeed, none of them gives attention to the performance incentives of takaful

[3] If the operator costs represent the cost of effort, then researcher can look at the effect of the different compensations on total effort.

operator. In this regard, this study contributes in filling the gaps. This research is motivated primarily by the need to improve the understanding of the takaful contracts and model that emerge when takaful operator opts to behave according to the financial incentives. While the literature provides evidence that there is a lack of credible industry data, the regulation also lacks on imposing standard to the takaful industry. Accordingly, this study extends to a specific contribution of the study to provide finer data through experimental research for examining the effect of the three types of incentives schemes on takaful operator performance using the existing theoretical model. Considering there are three types of incentive schemes which require three tasks; increasing the pool size, managing claim and underwriting, and investing technical reserve, which represent more complex action choices on the side of the agent, this study also will contribute to the literature on multiple task agencies. Therefore, this study also offers a novel setting for testing agency theory, involving 3 tasks with 3 main forms of compensation.

This study is expected to have implications for accounting research and practice. For accounting experiments, this study demonstrates how the agent is motivated by different contractual forms. For accounting practice, this study indicates that regulation should play a role in protecting a takaful participants' right as they are not represented and not properly oversight by shareholders. Collectively, this study is expected to contribute in three following ways – theoretical contribution on agency theory, methodology contribution, and contextual contribution i.e. takaful industry itself where practitioners and prior literature have criticised the shortfall in takaful regulation to form regulatory policy.

The main findings of the study are:

1) Only ji'alah increases operator's aggregate effort, represented by total operator costs, whereas high wakalah reduces the positive effect of ji'alah on effort.
2) Wakalah and ji'alah are substitutes for increasing the pool of policyholders.
3) Only ji'alah provides an incentive for the operator to control costs.
4) Only ji'alah provides a positive incentive for the operator to invest profits.
5) Mudarabah provides no discernible positive incentives.
6) A fixed salary has no 'gift exchange' impact on operator decisions.
7) Increasing wakalah benefits the operator, but at the expense of policyholders.

8) Increasing mudarabah has no impact on welfare[4].

9) Increasing ji'alah offers a Pareto[5] gain, with the operator benefitting, but not at the expense of policyholders.

10) Increasing the fixed salary offered to the operator (offering a 'gift') benefits the operator, but at the expense of policyholders.

Interestingly, the implications of these findings are that *only* ji'alah offers an efficiency gain to the agency as a whole. Although efficiency is improved with surplus sharing, policyholders do not share in the gains, either positively or negatively. These findings are in contrast to Khan (2015a), and there is no clear evidence of 'gifts' being reciprocated by better alignment of operator decisions with the welfare of policyholders, in contrast to Khan (2015b). This chapter has described an introduction of the study on the performance incentives in the takaful industry. In the next chapter, researcher will present a review of the literature dealing with takaful, corporate governance and agency theory.

1.6 Thesis Overview

The overall structure of the study takes the form of six chapters. The Chapter 1 begins by giving an introduction and overview of the topic. Chapter 2 provides a review of the literature dealing with takaful, corporate governance and agency theory. A detailed review of the theoretical setting used in Khan (2015a) and the testing of 'gift exchange' in Khan (2015b) is discussed in Chapter 3. Chapter 4 explains research methodology and method adopted in the study. Followed with a presentation and discussion of findings in Chapter 5. The final chapter, Chapter 6 includes summary, identification of limitations, and recommendations for further research.

[4] In the context of the study, welfare is expected utility. Expected utility equals average wealth for risk-neutral individuals. For the participants, the researcher has used the natural logarithm utility function to examine expected utility.

[5] The Pareto criterion allows multi-person comparisons of welfare. If one individual can be made better off *without* making anyone else worse off, then there is a Pareto gain. If making one individual better off makes someone else worse off, then we cannot say one outcome is better than the other. This is what we have for the gift example and for increasing wakalah: the operator is better off but the participants are worse off. There is therefore no Pareto gain for increased wakalah or for gift. For ji'alah, the operator is better off and the participants are no worse off, therefore we have a Pareto gain in this case.

CHAPTER 2

TAKAFUL, CORPORATE GOVERNANCE AND AGENCY THEORY

2.1 Introduction

In this chapter, an understanding of the importance of takaful along with the background of takaful in the context of Islamic finance are discussed. It shows the important role played by the takaful market in the lives of Muslims and non-Muslims. This chapter also presents a conceptual definition and the working mechanism of takaful so that the reader can understand and locate the problematised issues in corporate governance and agency issues. Takaful industry governance problems are stressed, both in theory and within the context of the takaful sector.

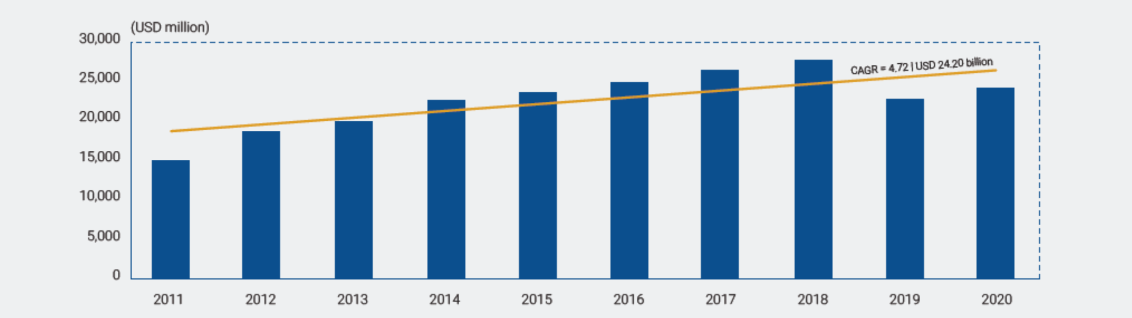
2.2 The Takaful Market

The takaful industry offers customers insurance products judged to be compliant with Islamic law, in return for payments into insurance funds managed and invested by a takaful company, henceforth called the ‘operator’. The market is relatively new, dating from 1979 in Sudan, where the first company was established. Forty years later, the size of the global Takaful market had reached $23.7 billion and includes life and general insurance. In 2019, takaful is available in more than 75 countries, from approximately 336 operators. Life insurance premiums are allocated to an investment and a risk fund[6].

The year 2019 is the first for which takaful data have been included in the IFSB's PSIFI system. “PSIFIs” implies that the data used in a corresponding table are obtained from the IFSB's Prudential and Structural Islamic Financial Indicators database (IFSB, 2021). The overall takaful sector’s direct contributions increased by 4.8% year-on-year to USD 24.2 billion in 2020, after a significant decline (–14.8%) in 2019. The decline was attributed to significant changes in the exchange rate (USD) used to denominate Iranian data. Over the past 10-year period (i.e. 2011–20), global takaful contributions have grown by an estimated compound average rate of 4.72%. See Diagram 2.1 below.

[6] General insurance premiums are allocated to the risk fund.

Diagram 2 - 1: Trend of Global Takaful Contributions (USD million) (2011 – 2020)



Source: Islamic Financial Services Industry Stability Report (IFSB, 2022, p. 46).

Since insurance is a normal good, with demand positively related to income, as Gross Domestic Products (GDP) of Muslim countries increase, further increases in the size of the takaful market are forecasted. In some takaful operations, upwards of 60% of participants have been non-Muslims (IFSB, 2017), and conventional insurance companies have begun to supply takaful products through Islamic Insurance 'windows'. The existence of takaful 'windows' in conventional insurance companies blurs the distinction between conventional and Islamic insurance (Abdul Wahab et al., 2007). A takaful window has the potential to increase its penetration that it will increase their customer numbers and narrow the protection gap if it is perceived as a transparent and well-regulated activity. Takaful operators have the ability to play a big role in the global insurance industry as a result of recent regulatory and public awareness improvements as well as a considerable projected population growth.

Most of the takaful companies that have survived have done so because they have been able to build up sufficient reserves (Asaria, 2013). The financial success of the takaful market depends, as it does for conventional insurance, on its having sufficient demand for insurance products, cost control operations, as well as profitable investment. These factors are reflected in the level of reserves. Costs are made up of operating expenses and paying of claims. Demand is determined by the premiums charged. Due to the law of large numbers, an increased customer base lowers average risk per customer.

Similar to other Islamic financial products, a distinctive *demand* characteristic for takaful is its compliance with Shariah rulings concerning *riba*, *gharar* and *maysir*[7]. According to

[7] For explanation of these terms, readers may refer to: Rosly (2005), ISRA (2012), Ariff & Iqbal (2011), and Hunt-Ahmed (2013).

Abu Kasim (2012), takaful consumers' confidence in the product is dependent on two criteria - (i) operations of the business must comply with Shariah principles or Islamic law, and (ii) wealth and financial progress of the takaful companies need to be disclosed. Due to that, it is important for takaful business to be regulated by Islamic scholars of the Shariah.

A Shariah Supervisory Board (SSB) certifies in an annual report that the takaful operations are compliant with Islamic law. SSB certification is much like an auditor's certification that a financial report is compliant. It provides little detail of the bases for the opinion. Abu Kasim (2012) argues that members of SSB are constrained by the advisory nature of their role, with no enforcement powers, and by the part-time nature of their involvement. The most cited areas of takaful operations that require a Shariah advisor's approval are underwriting surplus distribution and investment instruments (81%), allocation of qard facility (69.1%) and the investments portfolio (61.9%)[8].

Islamic financial institutions including takaful should act within the religious-based moral codes of Islam (Bhatti & Bhatti, 2010). This compliance with Shariah is vital in getting stakeholder confidence. This is supported by a study from Chapra & Ahmed in 2002. A survey with questionnaires aimed at 14 central bank regulators, 14 bank management, and 468 depositors was conducted in their study. The survey revealed that depositors in Islamic banks would withdraw their funds if banks did not comply with Shariah. Similarly, Wilson (2000) asserts that an Islamic unit trust launched in 1986 was initially unsuccessful, partly because it lacked certification of Shariah compliance. Another case was in South Africa where the whole of the Shariah board resigned from the First National Bank, when they did not have confidence in the credibility of the Islamic bank's operation. This resignation was believed to have dented investor confidence (Parker, 2012; Watch, 2012).

The IFSB-14 (2013) emphasises that non-compliance may render contracts invalid and expose operators to regulatory action, placing them at a disadvantage to compliant competitors and risking collapse of consumer confidence, resulting in business failure. On the other hand, Shariah compliance does not guarantee ethical probity. Alsaadi et al. (2017) find that membership of a Shariah index is associated with earnings management.

[8] See Asafa & Archer (2018).

The authors suggest that ethical principles are used by managers as a strategic tool to obscure opportunistic behaviour and they attempt to influence market perceptions through earnings management.

The distinctive characteristics of takaful and its complexity in certain products increase the importance of disclosure concerning its operating model. In particular, given the various models adopted in the industry. In practice, there are three forms of compensation received by takaful operator.

First, where a takaful operator manages the operations against an upfront agency fee it is called a wakalah (agency) contract. In this arrangement, the operator as an agent receives an upfront agency fee at the time a participant is admitted to the takaful pool which is generally expressed as a percentage of the premium collected from participants. The fund from the takaful pool will be used to cover all the claims and operational expenses and management of the takaful operation, which involves an investment of the technical reserves and all profits or losses are credited to the takaful pool. The takaful operator will still get a wakalah fee regardless of whether the pooling fund is a surplus or deficit, as long as new business is issued and continues to exist.

Second, the compensation comes from where the takaful operator receives a share in investment income from the technical reserve. This compensation is named the mudarabah (profit-sharing) contract. In this contract, the takaful operator only receives compensation from the investment of the technical reserves if it is making profit and nothing if it makes a loss. Mudarabah serves the purpose of allowing the fund to grow rather than leaving it stagnant, waiting for claims and other related expenses. The takaful operator is expected to invest funds according to the rules and principles of the Shariah and he must abide by the terms of the takaful contract. The takaful operator is also obligated to be very transparent with the participants on where and how the company has invested their funds thus avoiding any uncertainty and uneasiness among the public (Rosly, 2005, p. 492). If any profit is made from the investment then it will be appropriately distributed amongst the participants and the takaful operator based on the agreed profit-sharing ratio by all parties. The losses will be borne by the takaful participants and not shareholders, only except in cases where that the loss is caused by the negligence of the manager where the manager will be held jointly responsible for the loss. The entrepreneur does not assume any liability in case of the loss because he has already provided the expertise (Ariff & Iqbal, 2011, p. 194).

The third form is called ji'alah or the modified mudarabah contract. It is a surplus-sharing contract where the takaful operator receives a share in the insurance surplus net of the wakalah and mudarabah compensation and nothing if there is a deficit. Ji'alah is a performance-based contract where the surplus is shared with the takaful operator as an incentive for good performance in exercising prudent underwriting to protect the fund from turning into a deficit. Whether the takaful operator should be permitted to share in insurance surplus is a topic of disagreement within the Shariah community. Some Shariah scholars believe that this sharing violates the idea of mutuality and tarnishes the "purity" of the underlying Shariah-approved contract under wakalah. However, surplus sharing is viewed as a legitimate expansion of the wakalah contract by other Shariah experts. These scholars justify surplus sharing as an "incentive fee" for good performance (Gonulal, 2012, p. 104).

Most takaful operators use a combination of these three performance incentives in their operation as a form of operator compensations. For example, the mudarabah contract can be used for the investment purposes of the fund whilst wakalah can be used for the insurance activities of the fund. The contract of ji'alah may also be used to provide incentives for the takaful operator to upgrade performance because the compensation is tied to overall performance and output. The variety of Shariah-compliant contracts helps in providing more flexibility, but there is little economic analysis of their incentive properties. In summary, the takaful operators work for participants against a variety of performance incentives where these incentives may or may not induce the takaful operator to exert maximum effort due to the agency problem arising.

2.3 Conceptual Definition and Working Mechanism

Conventional insurance is defined as an arrangement between policyholder and insurance company where the policyholder receives a guarantee of financial protection against specified losses for a payment of a specified premium. On the other hand, takaful is a type of Islamic insurance which derives from the Arabic word *kafal,* means to take care of one's needs. Takaful has been recognised as an important source of enhancing the Shariah compliant protection against vulnerability or risk arising from untoward events. Takaful is defined as a cooperation and mutual assistance between members of a community whereby each member (i.e. participant or policyholder) makes a conditional contribution (*tabarru'*) of a certain sum of money into a pooling system (participants' fund) which will be used mutually to assist the members against a defined loss or damage (Abdul Wahab et al., 2007).

Takaful Act of Malaysia (1984) provides the first juridical definition:

> “A scheme based on brotherhood, solidarity and mutual assistance which provides for mutual financial aid and assistance to the participants in case of need whereby the participants mutually agree to contribute for that purpose”.

The Islamic Financial Services Board (IFSB, 2009) also defines takaful with a similar meaning as follows:

“Takaful is derived from an Arabic word that means joint guarantee, whereby a group of participants agree among themselves to support one another jointly for the losses arising from specific risks. In a takaful arrangement the participants contribute a sum of money as a *tabarru* commitment into a common fund that will be used mutually to assist the members against a specified type of loss or damage”.

AAOIFI (2015, p. 678) provides more details in relation to the concept of takaful and has defined takaful as a:

> “process of agreement among a group of persons to handle the injuries resulting from specific risks to which all of them are vulnerable. A process, thus initiated, involves payment of contributions as donations, and leads to the establishment of an insurance fund that enjoys the status of a legal entity and has independent financial liability. The resources of this fund are used to indemnify any participant who encounters injury, subject to a specific set of rules and a given process of documentation. The fund is managed by either a selected group of policyholders, or a joint stock company that manages the insurance operations and invests the assets of the fund, against a specific fee”.

In addition, AAOIFI also suggests that all takaful operators should minimally have a Shariah Supervisory Board and an internal Shariah auditor to review and verify Shariah compliance by the takaful operator (AAOIFI, 2015).

There are two types of takaful/insurance: life (family) and property/casualty or non-life (general) insurance. Life insurance is a long-term investment opportunity where it gives financial assistance to the participant's family in case of death and accident. The contributions are distributed to two funds – participants' investment fund and participants' risk fund. Other than life insurance, all types of insurance are called general (casualty) insurance. The general insurance is a contract of guarantee for a limited period, e.g. one year. Here, the contributions go directly to participants' risk fund. Examples of general insurance are motor insurance, home insurance, fire insurance and health insurance. The relationship between the takaful operator who manages participants' risk fund and takaful participants who contribute funding to the participants' risk fund can be either wakalah or mudarabah. It is the duty of the takaful operator to manage and safeguard the participant's risk fund interest. In the event of a deficit, the shareholder of the takaful operator will inject a *qard-ul-hassan*[9] (benevolent or gratuitous loan) to pay for claims therein. Alternatively, if there is a surplus generated from the risk fund, the participants and takaful operator will all be beneficiaries of this surplus based on the understanding of the ji'alah contract. Takaful industry governance problems are stressed, both in theory and within the context of the takaful sector in the following subsections below.

2.3.1 Corporate Governance

The previous section has shown to us the difference between takaful and conventional insurance, including Shariah compliance. Thus, takaful operators have an additional layer of corporate governance structure, namely Shariah governance consists of Shariah Supervisory Board and Shariah Auditing Committee. These roles work together with the traditional Board of Directors to monitor and approve operations assuring compliance to Islamic principles. Thus, this requires Shariah governance to ensure the confidence of all interested parties (i.e. stakeholders) for Islamic financial institutions where it has to be regulated by scholars of Shariah. However, there are several concerns regarding Shariah governance, including the issue of the Shariah board's independence as the board members are appointed and remunerated by the managers of the takaful company (Abdul Kader et al., 2014).

[9] Qard ul-hassan requires the operator to give interest-free loans when the takaful fund is in deficit (IFSB-11, 2010; Asafa & Archer, 2018). It is unclear whether qard ul-hassan is interest-free in practice, because of the charging of 'management fees'.

The takaful industry is considered new among Islamic financial institutions; however, it has a bright future and could have a strong growth if it is regulated efficiently. Challenges from inadequate regulation which can be seen from the different types of contracts available and weak corporate governance in terms of aligning incentives through takaful operator compensation arrangements are seemingly unsolved matters. Therefore, this sub section will outline the critical role in the takaful industry for corporate governance in aligning the incentives, as well as the role of regulation.

History has shown that the failure or unsoundness of corporate governance practices leads to financial losses (e.g., Enron, WorldCom) and, in the extreme, to economic financial crises (e.g., “credit crunch”, subprime mortgage crisis). Although corporate governance is not solely the main principle in running a firm successfully, it also ensures confidence by monitoring and controlling a company’s operations (Abu-Tapanjeh, 2009, p.557). The global failures in corporate governance not only involve conventional but also Islamic financial institutions, e.g., Ihlas Finance in Turkey, Dubai Islamic Bank, Islamic Bank of South Africa, Bank Islam Malaysia Berhad and Patni Cooperative Credit Society in India (Grais & Pellegrini, 2006; Okeahalam, 1998). Examples are the closure of the Islamic Investment Companies of Egypt (Zubaida, 1990) and Shariah non-compliance risk (Ahmed & Khatun, 2013). A study by Zubaida (1990) provides evidence that the closure of the Islamic Investment Companies of Egypt in 1988 was due to the weakness of corporate governance, irresponsible management, and improper regulatory frameworks as well their engagement in Shariah non-compliant activities. It has been demonstrated that corporate governance is a public policy issue for Islamic products.

Shariah governance is one of the main pillars in Islamic financial institutions. It has emerged as a regulating mechanism that governs the compliance of any particular Islamic business or financial institution and also is given the role to ensure the confidence of stakeholders in the Islamic finance industry. Therefore, sound Shariah governance is important as it not only has an effect image or reputation but also affects financial loss. For instance, one of the factors that lead to the closure of Kleinwort Benson in 1986 was due to the investor’s reservations about the absence of a Shariah board (Wilson, 2000). Also, Bank Negara Malaysia received more than 100 submissions from Islamic financial institutions for Shariah non-compliance reporting and less than 21% were actually Shariah non-compliant. The amount of actual loss due to this non-compliance is more than RM 200 billion which is a significant financial loss. According to IFSB-14 (2013), Shariah non-compliance may render contracts invalid under the Shariah and expose it to regulatory action. This fine and damages paid give a negative impact on the share price of the company and damage its relationship with investors, putting them at a disadvantage to their more compliant competitors. Therefore, we can conclude that non-compliance risk leads to the collapse of consumer confidence, resulting in business failure.

In the takaful industry, there is a complete separation of ownership of residual funds from their control. Policyholders have ownership of residual funds, but control rests solely with the operator. Policyholders are in a classic principal-agent relationship, with the operator acting as agent, and there is obvious potential for agency costs. There are also distributional concerns, because the operator sets its own compensation, subject to weak competitive pressures in the market. Mokhtar et al. (2015) report large variation prior to 2012 in the shares of residual funds extracted by Malaysian takaful companies. The range was 10% to 80%. Acting as regulator, the Bank of Negara Malaysia imposed an upper limit of 50% on this share, effective from 2012.

An agency is made up of a principal, and agents acting on behalf of principal, in return for payment. Agency costs arise when agents cannot costlessly be provided with incentives to act according to the preferences of principal. The costs may arise through 'moral hazard'. Moral hazard occurs when an agent's actions are hidden from but nevertheless affect a principal, allowing the agent opportunities for acting against the principal's preferences, leading to agency costs suffered by the principal[10].

There are thus three jointly necessary (but not sufficient) conditions for moral hazard problems to lead to agency costs. Firstly, the agent's actions affect the principal's welfare. Secondly, the agent has private information about its actions. Information is distributed asymmetrically. Thirdly, the agent's preferences for actions differ from the principal's. Takaful participants may want a low risk investment strategy with stable returns, while the operator may prefer a more aggressive investment strategy offering higher returns (IFSB-8, 2009). If any of these conditions is not satisfied, there is no moral hazard problem. However, all three are satisfied in Islamic financial institution, including takaful industry.

[10] The term 'moral hazard' arose in the insurance industry. It refers to increase in an insurance company's risk that arise when full insurance is given to a policyholder and he therefore becomes more willing to take on risky ventures.

With the takaful operator responsible for three broad categories of tasks, namely establishing the number of policyholders, controlling costs, and investing reserves, there is scope for moral hazard in three dimensions. Therefore, as well as agency costs arising from a lack of overall effort, the wrong mix of effort applied to the three tasks can also be a source of agency costs (Brüggen & Moers, 2007). Core et al. (1999) claim that firms with weaker corporate governance have greater CEO pay and poorer firm performance. This suggests a positive link between moral hazard problems and corporate governance.

To define corporate governance, researcher may adapt a definition used by (Tirole, 2006):

> "Corporate governance relates to the ways in which takaful participants assure themselves of getting a return for their contribution".

Assurance can come in many forms, including explicit monetary incentives, implicit incentives through reputation concerns, monitoring by boards of directors and other external parties, product-market competition, investor activism and takeovers.

According to Safieddine (2009), in Islamic banks, shareholders place their trust in the managers of the Islamic banks, expecting them to maximize their investment's value subject to following Shariah compliant methods. Contracts between Islamic banks and investment account holders are drafted in such a way that they give banks the right to share in profits but do not render them responsible for risks and losses. They also restrict the investment account holders from interfering in the management of their funds by banks. This creates the opportunity for managers of Islamic banks to extract personal benefits at the expense of investment account holders. Despite the investment account holders relying on managers to manage their money without expecting them to bear the risk of failure, account holders still do not have the right to observe how their investments are performing or the activities carried out by management. He finds corporate governance flaws relating to audit, control and transparency. In addition, investment account holders are not represented on the Board, and have no control or monitoring rights over their investments. Although the study conducted by Safieddine (2009) deals with Islamic banks, his insights are pertinent to takaful operators. Safieddine (2009) suggests future research into Islamic financial institutions could look beyond the control aspect of governance to the compensations of managers.

In the same vein, Zubaida (1990) provides evidence of Egyptian Islamic investment banks that operated without any regulatory oversight and without financial reporting, leading to final collapse. Similar criticisms are pertinent to the corporate governance of takaful operators. Participants have no control over residual funds, and no scrutiny of operator decisions. The three necessary conditions for the existence of agency costs are satisfied for the takaful industry: the operator can take hidden decisions in line with preferences that differ from those of the participants.

Regulation and corporate governance issues are increasingly gaining importance. Participants are hardly represented in takaful boards, and Shariah Supervisory Boards frequently lack knowledge of complex insurance issues. Who protects the interests of participants? The current system does not adequately protect participants; thus, regulators must take a stand as strongly as they can. To protect the welfare of participants, it follows that there is a need for regulation of operators. As argued by Asafa & Archer (2018), their survey revealed that '…more than two-thirds of the jurisdictions do not have guidelines specific to the *takāful* industry.' One approach to the improvement of corporate governance is to align the preferences of operator and participant through regulation of contractual compensation (fee) arrangements. If this is effective, one of the three necessary conditions for the existence of agency costs is not satisfied, and there is no agency cost.

There is variation in national regulatory decisions over permissible contracts, and there are no global organisations to ensure consistent regulation across jurisdictions. The Islamic Financial Services Board (IFSB) exists to account for differences in the nature of Islamic finance compared to its conventional counterparts, but its rulings are not accepted in a majority of countries with takaful markets. The Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) issues accounting guidelines, but its guidance is not mandatory. As Asafa & Archer (2018) states:

> '…guidelines are generally lacking on…fees deducted from participants' contributions…the PRFs (Participants' Risk Funds) of more than 70% of the *takāful* undertakings are in a state of deficiency owing to what could be described as an excessive level of fees and profit-sharing ratios… paid to the TO (Takaful Operator) …'

Khan (2015a) reminds us:

> 'Most regulators… do not have well-defined incentive-related guidelines, making them ill-equipped to deal with the agency problem…'

Khan (2019) reports that ji'alah is offered in a minority of cases, but that the AAOIFI prohibits ji'alah. Wakalah is widely used to compensate operators and is permitted by most regulators (except Saudi Arabia, which mandates ji'alah and prohibits hybrids).

In practice, the principal i.e. takaful participants are not able to choose the incentives schemes, which are decided by the takaful operator. Thus, there is a potential need for regulation to play a role in designing optimal incentive schemes. This is corroborated by a poll of industry opinions of global takaful, in which 70% of respondents assert that takaful regulation is insufficient to sustain the growth of takaful operations (Forward, 2016). The lack of standardization across regulators can be seen from key features of takaful regulation in the GCC countries. For instance, the Central Bank of Bahrain advocates usage of the wakalah-mudarabah hybrid. In contrast, the Saudi Arabian Monetary Agency requires takaful operators to follow the mudarabah contract, while the Qatar Financial Centre Regulatory Authority does not recommend any particular contract to be followed by a takaful operator. As a result, it provides illustrations of the diversity of regulatory jurisdiction.

2.3.2 Agency Theory

It has been noted in previous sections that takaful insurees (participants) and takaful operators are in a principal-agent relationship. Agency theory explores mechanisms for reducing agency loss to a principal through the provision of performance incentives to the agent. This study tries to investigate the form of compensation received by takaful operators in mitigating problems embedded with such a relationship. Jensen & Meckling (1976, p. 59) described the agency relationship as a contract under which the principal engages the agent to perform some services on his behalf which involves delegating some decision-making authority to the agent. The agent, however, may take decisions for his own benefit at the principal's expenses. In our case, takaful participants are the principals and takaful operators are the agents. The present study will focus only on moral hazard. The problem of adverse selection, or hidden type, is beyond the scope of this study.

Agency theory is the study of mechanisms for reducing agency costs, which arise in the presence of moral hazard when it is not feasible to implement the first-best solution, which involves disclosure of all private information, agreement on both actions and an optimal rule for sharing uncertain outcomes, and full implementation of the agreements. One mechanism for reducing agency costs is agent compensation (fee). Agent compensation can be used to mitigate moral hazard or to optimally share risk but, apart from in some special cases, not both. This leads us to a second-best solution in which agency costs are reduced but not eliminated.

Design of operator compensation in the takaful industry is constrained by Shariah rulings. Three permissible forms of compensation received by takaful operators are sales commission (wakalah), sharing of investment profit (mudarabah), and sharing of residual funds (ji'alah). These three forms are used in practice, either alone or in concert. Hence 'optimal' Shariah-compliant operator compensation in the takaful market does not necessarily lead to minimal agency costs. It should be noted that ji'alah is not universally accepted by scholars. Moreover, the above three forms of compensation are not an exhaustive list of allowable compensations (Mokhtar et al., 2015).

Since operators can determine the levels and forms of their own compensation, informed regulation is needed to safeguard the welfare of policyholders. It should seek to reduce agency costs and (possibly) to prevent excessive wealth transfers from policyholders to the shareholders of operator companies. The high level of wakalah fees has been noted in Asafa & Archer (2018). This, as well as high mudarabah profit shares, has led to 'continued deficits' in residual funds.

A question arises for regulators over the optimal strength and mix of these incentives for the tasks performed by the takaful operator: (i) attracting customers of a certain risk class for a given premium, (ii) underwriting, and (iii) investing technical reserves. The underwriting[11] effort involves selection (examining, accepting or rejecting risks),

[11] Underwriting is a term used by life insurers to describe the process of assessing risk, ensuring that the cost of the cover is proportionate to the risks faced by the individual concerned.

classification (of the participants selected into relevant categories such as low, medium or high risk) and pricing (choosing an appropriate premium for each classification).

Wakalah gives the operator a stake in building up fund revenue, but no stake in cost control or investment profit. Hence, if wakalah compensation alone is in place, the operator has an incentive to increase the customer base, regardless of risk class, increasing the cost of claims. This is similar to the incentives mortgage brokers faced to generate business in the run up to the financial crisis. The risk of the resulting subprime loans could be securitised and sold on for a profit.[12] Wakalah alone also does not impose any risk on the operator, because the sales commission does not depend on claims and investment performance.

Mudarabah gives a general incentive to perform the three tasks well, since technical reserve is a fraction of the residual funds, which in turn are affected by revenue and costs. The moral hazard problem in mudarabah is because mudarabah has a lower bound of zero, so that if the investment return is negative, the operator does not suffer a negative share. The operator has an incentive to take on risky investments, because it shares in large gains, and does not suffer any losses[13]. Myers (1977) has analysed a similar agency problem. With risky debt, a manager acting for equity has an incentive to take on risky projects, because he is effectively speculating with the money owed to lenders. If the project pays off, equity holders share in the gain, but if it doesn't, then equity is protected by limited liability.

Ji'alah also gives a general incentive to perform the three tasks well, since it gives the operator a share of residual funds, which are determined by revenue, including investment income, and costs. Ji'alah has a lower bound of zero, so that if residual funds are negative, the operator does not suffer a negative share. Like a mudarabah scheme, the operator therefore has an incentive to take on risk, because it shares in large gains, and does not suffer any losses.

Little attention has been paid to the economic efficiency of operator compensation as a means of reducing agency costs. Researcher is only aware of the work by Khan in 2015 (see Khan et al., 2020). Khan (2015a) attempted to identify Pareto optimal operator

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[12] Hence brokers only focused on mortgage sales and not the concomitant costs (see Hull, 2012, p. 190).
[13] An exception is when negligence is proven against the operator (see Ariff & Iqbal, 2011)

compensation, using calculus to analyse a model of the principal-agent relationship between policyholders and the operator. To be more precise, Khan (2015a) does not produce the optimal compensation. Given three exogenous (possibly sub-optimal) Shariah-compliant compensation forms, he seeks the optimal mix.

His model examines hybrid contracts of wakalah, mudarabah, and ji’alah, and studies economic incentives for the operator to efficiently perform the three broad categories of tasks mentioned above. His analysis suggests optimal contracts should feature wakalah and ji’alah.

However, there are important weaknesses in Khan’s model, including:

a) the objective function does not accurately capture the welfare of policyholders.
b) the model addresses an insignificant agency problem with negligible agency costs, due to excessive operator costs rendering low effort optimal.
c) the operator’s decisions have no impact on the risks faced by the takaful fund, a feature that limits interest in the model’s results.

Details of these weaknesses are presented in Chapter 3. According to Khan et al. (2020) in their bibliometric review of the theoretical and empirical takaful literature, the model has not been subjected to detailed empirical testing.

2.4 Review of Empirical Studies

Through the use of a meta-literature methodology, Khan et al. recently have completed a study that precisely analyses the takaful contributions that have already been made (2020). They assert that academic study on takaful is restricted as compared to other financial topics, being relatively new but rapidly expanding (p. 390). Because there are so few specialists in this unique form of insurance, the takaful literature is very scarce and poorly researched (Al-Amri, 2015, p. 346). The majority of takaful studies (Masud, 2011; Abu Kasim, 2012; Abdul Wahab et al., 2007; Billah, 1998; Coolen-Maturi, 2013; Kamil & Mat Nor, 2014; Kwon, 2007) have concentrated on the concepts and framework of takaful firms.

Several recent studies investigating the factors of demand have been carried out on takaful. For instance, Sherif & Shaairi (2013) use socio-demographic and economic data to determine the determinants that affect demand for family takaful in Malaysia. The Central Bank of Malaysia and International Financial Statistics provided the data. According to the study, elements that are positively correlated with takaful demand include income, Islamic banking development, education, dependence ratio, and Muslim population. Sherif & Ahmed (2017) used annual reports of takaful to further examine the factors that drive family takaful demand. They discovered that female life expectancy is another factor that is positively associated to family takaful in the Middle East and North Africa region.

Considering a different approach, Akhter et al. (2017) analyse the variables influencing the demand for takaful and conventional insurance during the Global Financial Crisis of 2007 - 2008. In addition to WDI, they use Swiss Re Sigma Reports, the World Takaful Conference, and Ernst & Young Takaful Reports. They discover that, although takaful is more resilient, demand for both types of insurance is severely impacted by GDP/capita during times of crisis. They also find that the demand for takaful is strongly correlated with income and education. This is consistent with the previous findings. However, a different researcher who used Questioner Based Data and looked at education, has found that those with higher education levels preferred conventional insurance whereas most religious people preferred takaful (Ustaoğlu, 2014).

The efficiency of takaful has also received attention in recent literature, as improving operational cost efficiency is perhaps one of the most crucial corporate goals for takaful businesses. For instance, Abdul Kader et al., (2010) analyse the cost efficiency of takaful companies. They discover that adding non-executive directors and separating the roles of CEO and chairman have no positive impact on cost efficiency. On the other hand, the cost effectiveness of takaful companies is positively impacted by board size, firm size and product specialization. They also find that the regulatory environment has no statistically significant impact on improving cost effectiveness. In another study, a broader perspective has been adopted by Alshammari et al. (2018) who analyse the effect of competition on the cost effectiveness of conventional insurance and takaful industries. They find that the relationship between efficiency and competitiveness is really negative for conventional insurance and only positively so for takaful. This finding might suggest the regulators to encourage a competitive takaful market in order to achieve efficiency improvements, while applying limits and market entry requirements wisely.

On a different factor, Baharin & Isa (2013) investigate the relationship between organisational structure and cost effectiveness in regard to the takaful and conventional insurance operators in Malaysia. They discover that, on average, there is a significant difference in cost efficiency between the takaful and conventional insurance. Furthermore, it was discovered that takaful is less cost-effective than conventional insurance. In a similar vein, takaful is moderately cost-effective in the GCC according to Al-Amri (2015).

Efficiency research and its applications to corporate governance are another area of takaful study. The number of non-executive directors on the board has an impact on the cost efficiency of takaful companies depending on how it interacts with board size, according to Abdul Kader et al. (2014) who highlight the relationship between cost effectiveness and board composition in takaful. According to a different study by Karbhari et al. (2018), the scale efficiency of takaful companies is increased by Shariah Supervisory Boards. In conclusion, earlier research has provided insight into the elements that affect cost effectiveness to advance a deeper comprehension of the economics of takaful companies.

Elsewhere, Alkhan & Hassan (2020b) also look into whether takaful operators actually keep separate accounts for the operator and participants' fund. The study analyses secondary data pertaining to two takaful operators in Bahrain and Saudi Arabia as case studies for the empirical investigation. Their findings support the Bahraini Shariah's requirement that the operator and participants maintain separate accounts. The financial statements of Saudi takaful companies, in contrast, do not make the existence of two different funds very evident. This finding is vital as it is considered as a main distinctive feature between conventional insurance and takaful which is to be Shariah compliant.

Recently, Abdul Shukor (2020) takes a different approach in his investigation of the factors that contribute to the development of client trust in takaful agents using 182 questionnaires respondents. He discovered that the agents' communication, expertise and the takaful operator's image all have an impact on the clients' trust in them. In a related study, Alkhan & Hassan (2020a) investigate how takaful operators select the takaful model to use while managing their insurance operations. It was discovered using a single case study of Bahrain that takaful operator generally utilise either the wakalah-mudarabah hybrid or the wakalah model of takaful, depending on whether they are managing or investing the participants' general or family fund, respectively.

Equipped with the above-mentioned literature, it is obvious that no studies have been done that focus on the contractual arrangement, and indeed, none of them have even paid attention to the performance incentives of takaful operator. In this regard, this study contributes in filling the gaps in this area with the aim of the study is to supply empirical evidence on the relative efficiencies of some common forms of agent compensation for the purpose of improving overall efficiency.

The sole empirical work examining incentives is Khan (2015b), in which the performance of hybrid contracts was tested, with an additional focus on 'gift exchange'. His results are as follow:

Table 2 - 1: Khan's (2015b, p. 1178) empirical results.

	Loss Ratio	Expense Ratio	Combined Operating Ratio	Insurance Profit
Percentage Wakalah (f)	-0.78***	-3.65***	-4.43***	4.69***
(f^2)	0.0053***	0.0299***	0.0352***	-0.0363***
Mudarabah Dummy (m)	8.23	-15.24	-7.02	-16.60**
Ji'alah Dummy (s)	-13.71	-26.83***	-40.54***	46.98***

Note: * indicates 10% significance, ** indicates 5% significance, and *** indicates 1% significance.

In Khan's (2015b) study, the insurance profit was calculated before surplus sharing. Real growth rate and the inflation rate were included as control variables. An unbalanced panel data set of 174 observations were used to estimate the regressions. The above estimates used fixed effects. The figures and significances were similar when random effects were used.

Khan concludes that both wakalah and ji'alah incentives improve performance; and mudarabah should not be included in any incentives. In addition, the relationships between wakalah and the four performance variables are quadratic and there is significant evidence of gift exchange.

Gift exchange refers to a situation in one-shot or finitely-repeated interactions, whereby the agent is paid a fixed salary. The agent responds by supplying minimum effort. Anticipating this, the fixed salary is set at the minimum value acceptable to the agent. But according to gift exchange theory, the agent reciprocates a high salary with high effort. Therefore, there should be a positive (negative) relationship between the level of the fixed salary and supplied effort (the entity's costs).

Khan interprets the estimated relationships between wakalah and the four performance metrics as evidence of gift exchange. However, it should note that wakalah is not a fixed salary, but a variable reward for performance in building the customer base. In the absence of gift exchange, the expectation is that expenses would be unaffected by variation in wakalah. However, the loss ratio is defined as

$$\frac{net\ claim\ expense}{net\ earned\ premium}\ x\ 100$$

Since the denominator is expected to be positively related to wakalah, the ratio in the absence of gift exchange is expected to be negatively related to wakalah. Therefore, a negative coefficient per se is not indicative of gift exchange. The same objection may be raised for the expense ratio and the combined operating ratio. Note also that insurance profit is not deflated by net earned premium. A positive coefficient on wakalah for the insurance profit regression may merely affect the larger customer base expected for higher wakalah.

Khan (2015b) also suffers from specification and data problems. They are:

1) Errors in variables – due to lack of disclosure in annual reports, continuous ji'alah and mudarabah variables had to be proxied by dummy variables.
2) Endogeneity – choice of compensation may depend upon insurance profit performance.

According to Johnston (1984, p. 430), errors in explanatory variables cause bias and inconsistency in all the explanatory variables, even those measured without error. When there is endogeneity, a simultaneous equations model is appropriate, with the dependent and endogenous independent variables each providing an equation. Two-stage least squares rather than ordinary least squares, or the use of instrumental variables, is recommended to overcome biased estimation of coefficients.

The sole empirical work examining incentives is Khan (2015b), in which the performance of hybrid contracts was tested, with an additional focus on ‘gift exchange’. Researcher believe that the findings of this study could offer all stakeholder – policyholders, takaful companies, Islamic scholars and regulatory body alike – a better guideline to further develop the takaful industry.

2.5 Conclusion

Overall, the chapter presents a conceptual definition and the working mechanism of takaful so that the reader can understand and locate the problematised issues in corporate governance and agency issues. Takaful industry governance problems are stressed, both in theory and within the context of the takaful sector.

In agency framework, they have a principal who delegates decisions to an agent. And, in return, they give some payment. And the principal gets what is left after the payment. Here, the takaful participants is principal and operator is an agent because the operator takes the decision that might benefit to himself at the principal’s expenses and gets compensation for that. And policyholder gets what is left after the decision was taken. Agency costs arise when we can’t costlessly implement the first-best solution, defined by 3 conditions: disclosure of all private information, agreement on both actions and the sharing of the outcome, and full implementation of the agreement. The agency cost is the difference between the value achieved and the value in the first-best solution. This difference is a cost to the agency.

The takaful operator sets its own compensation without any challenged by the policyholder, this issue become the concern of the study. Also, prior study discovered that the extreme share was reported in takaful companies at the range of 80%. In addition, the surplus that the takaful companies have is much smaller because of excessive amount is taken out in compensation was also highlighted in prior studies. The distribution of gains become the concern of the research because it’s making the residual funds in deficits in many cases. Therefore, the study suggests that takaful policyholders are in a weak position in terms of corporate governance. To avoid agency costs, there is a need for informed regulation of operator compensation.

CHAPTER 3

LITERATURE REVIEW

3.1 Introduction

As the aim of this research is to provide takaful companies and regulators with evidence for understanding the role that incentives play in the takaful industry, so that they will be equipped with well-defined incentive related guidelines. In order to achieve the objective, for the empirical work this study is based on a theoretical model by Khan (2015a), which investigates the forms of compensation received by takaful operators and their role in alleviating problems embedded in the principal-agent relationship. Thus, this chapter offers additional literature that was thoroughly studied and incorporated to contextualise and enhance the research.

3.2 The Agency Model in Khan (2015a)

In Khan (2015a), the relationship between takaful participants and operator is modelled as an agency, with participants as collective principal and operator as agent. The purpose of his model is to determine the optimal hybrid contract of wakalah, mudarabah and ji'alah to be offered to the operator. Thus, Khan (2015a) does not seek the unconditional optimal compensation, but the optimal hybrid of three Shariah-compliant forms of agent compensation, which may not in themselves be optimal. His conclusions have not been subjected to empirical verification, which is the objective of the present study. The researcher adopts his agency model as the basis of the experiment, with some necessary modifications to be discussed in Section 3.5. The model is outlined below.

The operator has 3 decision variables (tasks):

1) Number of policyholders, $n \geq 0$
2) Underwriting effort, $0 \leq e_u \leq \bar{e}_u$
3) Proportion of average technical reserves invested, $0 \leq k \leq 1$

The upper bound on effort is $\bar{e}_u$ and is not mentioned in Khan's (2015a) paper. It is implied, however, if expected operating expenses are not to be negative. Because negative k (borrowing) is not allowed, we assume k cannot be negative and that $k > 0$ is not permitted if average technical reserve is negative.

The operator receives 3 forms of compensation. They are:

(i) Wakalah ($\alpha \in [0,1)$) which is proportion of insurance premium earned.

(ii) Mudarabah ($m \in [0,1)$) which is proportion of investment income earned.

(iii) Ji'alah ($s \in [0,1)$) which is proportion of insurance surplus earned.

Khan (2015a) places the restriction on permissible values of α as $\alpha \in [0,1]$. Researcher believes this should be $\alpha \in [0,1)$, in order to rule out the possibility of the operator taking all the premium income. Similar restrictions should be placed on the other two parameters: $m, s \in [0,1)$. If investment income is negative, then $m = 0$. And if insurance surplus (gross of s) is negative, then $s = 0$.

Khan's (2015a) approach has two stages as follows:

a) Stage 1: Find the triple (n, e_u, k) that maximises the expected utility of the operator, U^A, as a function of (α, m, s).
b) Stage 2: Insert the optimal n, e_u, k functions from Stage 1 into the expected utility for participants, U^P, and find the triple (α, m, s) that maximises U^P.

The model has a structure inconsistent with market practice. In takaful markets, operators set compensation, rather than participants, as take-it-or-leave-it contracts with participants, and a triple (α, m, s) that maximises U^A, not U^P. Hence, the need for regulation of the takaful industry, in order to protect participants and the viability of the industry. The researcher will only consider formally Stage 1 of Khan's (2015a) model, dealing with the behavioural response of operators to variation in (α, m, s), and its consequences for agency welfare.

Khan (2015a) assumes fund income is $n \times p$, where p is the parametric unit insurance premium. p is assumed to be a fixed parameter, beyond the control of the operator, and determined in a competitive market. The environment is thus restricted to a single risk class.

Operating expenses of the fund are stochastic:

$$\widetilde{COE} = n(c - ue_u) + \tilde{\varepsilon}_c$$

where c, u are parameters representing average expense with minimum operator effort and the sensitivity of expenses to effort. The presence of $\tilde{\varepsilon}_c$ embeds within the model a moral hazard problem since observation of (COE, n)[14] does not perfectly reveal e_u. The usual benefits from pooling risk are present, because $\tilde{\varepsilon}_c \sim N(0, \sigma_c^2)$, so average expense risk per policy is σ_c/n, decreasing in n, although total expense risk is independent of n.

Income on investment of the technical reserve ($IITR$) is assumed to be:

$$\widetilde{IITR} = iI + \tilde{\varepsilon}_i$$

Investment $I = kn((1-\alpha)p - c + ue_u)$, i denotes the expected rate of return on investment, random noise $\tilde{\varepsilon}_i \sim N(0, \sigma_i^2)$, and $E(\tilde{\varepsilon}_c, \tilde{\varepsilon}_i) = 0$. This is Khan's (2015a) "base case", in which there is no linear relationship between random expenses and returns. The technical reserve is defined as operating revenues, net of the wakalah payment to the operator, less *expected* operating expenses. A proportion k is invested.

Given these assumptions, net surplus on the fund, $\tilde{x}_P$, after operator compensation, is:

$$(1-s) \times$$

$$\begin{pmatrix} n(p(1-\alpha) - c + ue_u)(1 + (1-m)ik) \\ -\tilde{\varepsilon}_c + (1-m)\tilde{\varepsilon}_i \end{pmatrix}$$

While operator compensation[15] is:

$$\widetilde{W} = \alpha np +$$

$$n\big((1-\alpha)p - c + ue_u\big)[s + ik(m + (1-m)s)]$$

$$+\tilde{\varepsilon}_i(m + (1-m)s) - s\tilde{\varepsilon}_c$$

[14] COE is written without tilde here, because we have in mind observation of *realised* expenses.
[15] Adding together the wakalah, mudarabah and surplus-sharing elements of the contract

Summing the previous two expressions gives total cash inflow to the agency:

$$\alpha np +$$

$$n(p(1-\alpha) - c + ue_u)(1 + ik)$$

$$-\tilde{\varepsilon}_c + \tilde{\varepsilon}_i$$

The operator's preferences are assumed to depend on money payments, $\widetilde{W}$, and operator costs, C:

$$\frac{c_p}{2}n^2 + \frac{1}{2}(ne_u)^2 + \frac{1}{2}I^2$$

with $c_p > 0$. The first cost term relates to the decision on number of participants n. The second term relates to underwriting effort e_u, and the final term is the cost of investment.

Khan adopts mean-variance utility functions for the operator and the participants

$$\Rightarrow U^A = E(\widetilde{W}) - C - \frac{1}{2}\phi Var(\widetilde{W})$$

where ϕ is the Arrow-Pratt absolute risk aversion parameter.

The operator's optimisation problem is therefore:

$$\max_{n,e_u,k} U^A = \alpha np + n\big((1-\alpha)p - c + ue_u\big)$$

$$\times [s + ik(m + (1-m)s)] - \frac{c_p}{2}n^2 - \frac{1}{2}(ne_u)^2$$

$$-\frac{1}{2}[kn((1-\alpha)p - c + ue_u)]^2$$

The expected value of operator compensation has been substituted into the objective function. The variance component has been omitted, because it is a constant. The operator cannot affect its value with any of the three decision variables. It must be added back in the second stage of Khan's analysis (not covered here), when the principal's optimisation problem is tackled, since the level of the agent's expected utility affects the analysis via the participation constraint and the triple (α, m, s).

The operator's optimisation problem is subject to:

$$e_u \leq \bar{e}_u = \frac{c}{u}$$

$$k \leq 1$$

and non-negativity of $\{n, e_u, k\}$. These constraints are neglected in Khan's (2015a) paper. The first two constraints are included to ensure expected costs per customer are not negative and the operator cannot invest more than the total of the technical reserve. They are probably not binding and can probably safely be ignored.

To conserve space, it will be convenient to simply the notation as follows:

$$\gamma_1 \equiv \alpha p \geq 0$$

$$\gamma_2 \equiv (1-\alpha)p - c$$

$$\gamma_3 \equiv i(m + (1-m)s) \in [0,1)$$

These are parametric values for the first stage of the solution method. γ_2 can be negative if wakalah is sufficiently high.

The partial derivatives are as below.

$$\frac{\partial \gamma_1}{\partial \alpha} = p,\ \frac{\partial \gamma_1}{\partial m} = 0, \frac{\partial \gamma_1}{\partial s} = 0$$

$$\frac{\partial \gamma_2}{\partial \alpha} = -p,\ \frac{\partial \gamma_2}{\partial m} = 0, \frac{\partial \gamma_2}{\partial s} = 0$$

$$\frac{\partial \gamma_3}{\partial \alpha} = 0, \frac{\partial \gamma_3}{\partial m} = i(1-s), \frac{\partial \gamma_3}{\partial s} = i(1-m)$$

The following *necessary* first-order Kuhn-Tucker conditions must be satisfied for a maximum:

$$U_n^A = \gamma_1 + (\gamma_2 + ue_u)[s + \gamma_3 k] - c_p n - ne_u^2$$

$$-k^2 n(\gamma_2 + ue_u)^2 \leq 0$$

$$n \geq 0,\ \ nU_n^A = 0$$

$$U_{e_u}^A = nu[s + \gamma_3 k] - n^2 e_u - k^2 n^2 u(\gamma_2 + ue_u) \leq 0$$

$$e_u \geq 0,\;\; e_u U_{e_u}^A = 0$$

$$U_k^A = n(\gamma_2 + ue_u)\gamma_3 - kn^2(\gamma_2 + ue_u)^2 \leq 0$$

$$k \geq 0,\;\;\; kU_k^A = 0$$

$U_n^A, U_{e_u}^A$ and U_k^A are the partial derivatives of operator expected utility with respect to n, e_u, k respectively. Like Khan, we assume differentiability throughout.

Khan's solution gives, for each decision variable, marginal cost equal to marginal benefit:

$$nc_p = \gamma_1 + \gamma_2 s$$

$$ne_u = us$$

$$kn(\gamma_2 + ue_u) \equiv I = \gamma_3 < 1$$

3.2.1 The reduced form solution for n is:

$$n = \frac{\gamma_1 + \gamma_2 s}{c_p}$$

<u>Hypothesis 1</u>: n is increasing in α.

H_1: The number of policyholders is increasing in the proportion of insurance premium earned.

$$\frac{\partial n}{\partial \alpha} = \frac{(1-s)p}{c_p} > 0$$

<u>Hypothesis 2</u>: The positive effect of α on n is decreasing in s.

H_2: The positive effect of the proportion of insurance premium earned on the number of policyholders is decreasing in the proportion of insurance surplus earned.

$$\frac{\partial^2 n}{\partial \alpha \partial s} = \frac{-p}{c_p} < 0$$

Thus, although the wakalah incentive is always positive, it declines as s increases.

Hypothesis 3: n is increasing in s if and only if $\gamma_2 > 0$.

H_3: The number of policyholders is increasing in the proportion of insurance surplus earned if and only if $\gamma_2 > 0$.

$$\frac{\partial n}{\partial s} = \frac{\gamma_2}{c_p}$$

Here, we could say that n goes up when s goes up, but this effect happens only when the fixed proportion of the insurance premium, α is sufficiently small. This derivative is positive if and only if $\gamma_2 > 0$. This can be seen from $\gamma_2 \equiv (1-\alpha)p - c \Rightarrow p(1-\alpha) - c > 0 \Rightarrow \alpha < 1 - \frac{c}{p}$.

Hypothesis 4: α by itself is more powerful as an incentive to increase n than is s by itself.

H_4: The proportion of insurance premium earned is by itself more powerful as an incentive to increase the number of policyholders than is the proportion of insurance surplus earned by itself.

$$\frac{\partial n}{\partial \alpha}(s = 0) = \frac{p}{c_p} > \frac{\partial n}{\partial s}(\alpha = 0) = \frac{p - c}{c_p}$$

Hypothesis 5: n is unaffected by m.

H_5: The number of policyholders is unaffected by the proportion of investment income earned.

$$\frac{\partial n}{\partial m} = 0$$

m only affects the proportion of average technical reserves invested indicating a one-dimensional incentive.

3.2.2 The reduced form solution for e_u is:

$$e_u = \frac{c_p us}{\gamma_1 + \gamma_2 s}$$

Hypothesis 6: e_u is increasing in s if and only if $\gamma_1 > 0$.

H_6: The underwriting effort is increasing in the proportion of insurance surplus earned if and only if $\gamma_1 > 0$.

$$\frac{\partial e_u}{\partial s} = \frac{u\gamma_1 c_p}{(\gamma_1 + \gamma_2 s)^2}$$

Hypothesis 7a[16]: e_u is decreasing in α if and only if $s > 0$.

H_{7a}: The underwriting effort is decreasing in the proportion of insurance premium earned if and only if $s > 0$.

$$\frac{\partial e_u}{\partial \alpha} = -\frac{usp(1-s)c_p}{(\gamma_1 + \gamma_2 s)^2}$$

Khan states that "Wakalah…incentives do not have any *direct* effect on the underwriting effort." (Italics added.) The reduced form shows that there is an effect, since α affects n, which affects e_u.

Hypothesis 8: e_u is insensitive to m.

H_8: The underwriting effort is insensitive to the proportion of investment income earned.

$$\frac{\partial e_u}{\partial m} = 0$$

[16] Hypothesis 7b appears in the next subsection on gift exchange.

3.2.3 The reduced form solution for k is:

$$k = \frac{c_p \gamma_3}{\gamma_1 \gamma_2 + \gamma_2^2 s + u^2 c_p s}$$

Hypothesis 9: k is increasing in m if and only if $\gamma_1 \gamma_2 + \gamma_2^2 s + u^2 c_p s > 0$.

H₉: The proportion of average technical reserves invested is increasing in the proportion of investment income earned if and only if $\gamma_1 \gamma_2 + \gamma_2^2 s + u^2 c_p s > 0$.

$$\frac{\partial k}{\partial m} = \frac{i(1-s)c_p}{\gamma_1 \gamma_2 + \gamma_2^2 s + u^2 c_p s}$$

Hypothesis 10: k is increasing in α if and only if $\gamma_2 - \gamma_1 - 2\gamma_2 s < 0$.

H_{10}: The proportion of average technical reserves invested is increasing in the proportion of insurance premium earned if and only if $\gamma_2 - \gamma_1 - 2\gamma_2 s < 0$.

$$\frac{\partial k}{\partial \alpha} = \frac{-p c_p \gamma_3 (\gamma_2 - \gamma_1 - 2\gamma_2 s)}{\left[\gamma_1 \gamma_2 + \gamma_2^2 \, s + u^2 c_p s\right]^2}$$

Khan is silent on this incentive, which is caused by the effect of α on the technical reserve.

Hypothesis 11: k is increasing in s if and only if $i(1-m)\left(\gamma_1 \gamma_2 + \gamma_2^2 \, s + u^2 c_p s\right) > \gamma_3\left(\gamma_2^2 \, + u^2 c_p\right)$.

H_{11}: The proportion of average technical reserves invested is increasing in the proportion of insurance surplus earned if and only if $i(1-m)\left(\gamma_1 \gamma_2 + \gamma_2^2 \, s + u^2 c_p s\right) >$

$\gamma_3\left(\gamma_2^2 \, + u^2 c_p\right)$.

$$\frac{\partial k}{\partial s} = \frac{c_p}{\left(\gamma_1 \gamma_2 + \gamma_2^2 \, s + u^2 c_p s\right)^2}$$

$$\times \begin{bmatrix} i(1-m)\left(\gamma_1 \gamma_2 + \gamma_2^2 \, s + u^2 c_p s\right) - \\ \gamma_3\left(\gamma_2^2 \, + u^2 c_p\right) \end{bmatrix}$$

3.3 The Gift Exchange Model in Khan (2015b)

According to the theory of gift exchange, agents respond to a high fixed salary with high e_u. This is in contrast to the prediction of agency theory, where the receipt of a gift in a one-shot game has no effect on the agent's decisions. In the empirical analysis of Khan (2015b) wakalah is interpreted as a gift from participants to the operator. Thus, we have:

Hypothesis 7b: e_u is increasing in α.

H_{7b}: The underwriting effort is increasing in the proportion of insurance premium earned.

$$\frac{\partial e_u}{\partial \alpha} > 0$$

3.4 Welfare Metrics

The variables $\{n, e_u, k\}$ mediate the relationship between the set $\{\alpha, m, s\}$ and the welfare of the operator and of the participants. In Khan (2015a), the Pareto optimal set $\{\alpha, m, s\}$ is identified. The corresponding welfares are largely a function of the risk attitudes of operator and participants, which in the experiment are indeterminate. Researcher chooses not to control risk attitudes in order to allow them to affect the observable data. Hence, instead of directional research hypotheses of the effects of varying $\{\alpha, m, s\}$, the researcher offers two-tailed tests of null hypotheses of 'no change' in the various components of welfare, for the following performance variables.

First, the total amount of 'effort' supplied by the operator, proxied by its operator costs, C. The mix of effort, as researcher shall see, is illustrated by observing effects on the set of decision variables $\{n, e_u, k\}$. Second, total cash inflow to the agency, $W + x_p$, and its breakdown across the two parties, W and x_p. Greater or equal total cash inflow is a necessary condition for an outcome to achieve a Pareto gain. It may not be sufficient. The distribution of total cash inflow among parties also matters. Third, net surplus to the fund per participant, x_p/n. It is possible for the net surplus to increase but the share of each participant to be so diluted by an increase in the number of participants that each is worse off. This dilution effect is ignored in the optimisation procedure of Khan (2015a). Fourth, the welfare of all participants and each, assuming risk aversion, using a natural logarithmic utility function, $\ln x_p$ and $\ln x_p/n$. The logarithmic utility function is a strictly concave positive monotonic utility function. It therefore captures the phenomenon of diminishing marginal utility of money, which underlies risk averse attitudes.

3.5 The Modified Experimental Environment

To address weaknesses in Khan's model and to avoid impractical and unethical features in the laboratory implementation, the environment created for the experiment differed from the model in Khan (2015a). The first weakness relates to the operator's costs:

$$\frac{c_p}{2}n^2 + \frac{1}{2}(ne_u)^2 + \frac{1}{2}I^2$$

The use of squared terms serves to bound the solution from above. These upper bounds are extremely low. For example, Khan's solution has:

$$kn(\gamma_2 + ue_u) \equiv I = \gamma_3 < 1$$

The aggregate investment must therefore be minimal in the solution. This is because the marginal cost (on the left hand side) is equal to aggregate I, and marginal benefit (on the right hand side), to be shared between operator and the fund, is less than unity $\gamma_3 < 1$.

Similarly, the marginal effect on the operator's costs from increasing e_u, *ceteris paribus*, is $n^2e_u + k^2n^2u(\gamma_2 + ue_u)$. For large n, costs of increasing effort are prohibitive, forcing optimal operator effort down close to zero:

$$e_u = \frac{us}{n}$$

These expressions come from the necessary condition on the partial derivative for e_u. The marginal benefit from increasing e_u is $nu[s + \gamma_3 k]$, which has order n compared to the above marginal cost which has order n^2. The optimal solution is decreasing in n.

To demonstrate the undesirable effects of huge operator costs on the calibration of the model, the researcher uses Khan's solution, with plausible parameters $p = 100,\ c = 20,\ u = 1,\ i = 0.1,\ c_p = 0.02$. If there were no separation of ownership and control, and therefore no agency cost, the operator could enjoy full ownership of all cash flows, $s = 1, m = \alpha = 0$. But in this first-best scenario, the operator has little incentive to either control the costs of operating the fund by applying effort, e_u, or to make investments, k.

The first-best solution is found by maximising the expected gross cash inflow of the fund to the two parties, net of operator. The variance terms in the mean-variance utility functions are fixed with respect to operator decisions and can therefore be neglected. Maximising joint expected cash inflow to the two parties is equivalent to maximising expected cash inflow if one party has full ownership of all cash flows. The solution can then be conveniently found from Khan's equations after setting $s = 1, m = \alpha = 0$.

Khan's solution is close to zero:

$$e_u = 0.00025,\ k = 3.1 \times 10^{-7}$$

When the first-best solution involves extremely low levels of performance, a wide range of compensation arrangements can be expected to produce approximately optimal decisions. Consider, for instance, a situation in which the operator has neither a stake in residual funds nor investment returns, and therefore poor incentives to exercise cost control and invest technical reserves, but receives 50% sales commission, $\alpha = 0.5,\ s = m = 0$. This scenario involves separation of ownership from control, yet little agency cost, because Khan's solution gives $e_u = 0,\ k = 0,$ scarcely different from the first-best solution. A further example shows the ineffectiveness of the mudarabah incentive when it is increased from zero to 0.6. With $\alpha = 0.5,\ m = 0.6, s = 0$, Khan's optimal values are $e_u = 0,\ k = 8 \times 10^{-7}$.

The 'incentive problems' are due to the huge costs of the operator, which render it too expensive for the policyholders to incentivise the operator to manage costs and make investments. Agency costs are absent in the problem Khan addresses, because the first-best solution sets the bar so low. The only question to be addressed is the optimal distribution of the aggregate first-best payoff between principal and agent when the two parties have different attitudes to risk. The optimal sharing rule for first-best cash inflow uses a lump-sum transfer to the policyholders to maximise their welfare subject to meeting the reservation utility of the operator. The apportionment of risk in the transfer will depend on the relative values of the risk parameters for the two parties. If policyholders are risk averse and the insurance company can be treated as risk-neutral, the operator pays a *fixed* lump sum to the policyholders and absorbs all the risk. The first-best solution then *fully* internalises the gains from *privately informed* operator decisions, thus eliminating the minimal agency cost, and apportions risk in an efficient manner. The insurance company can be treated as risk-neutral if the company's shareholders are sufficiently well-diversified. Individuals seeking actuarially fair insurance are clearly risk-averse. Lump-sum transfers are not considered in Khan's solution.

Hence, in the modified environment, the researcher specifies the following *quasi-linear* cost function for the operator:

$$\beta_1 n + \beta_2 n e_u + \beta_3 I$$

where $\beta_i,\ i = 1,2,3$ are constants. The researcher dispenses with the squared terms and apply parameter coefficients to each term. The middle term is actually an interaction term, not linear, hence the term 'quasi-linear'.

The second weakness of Khan's model concerns how risk enters his model in the expressions for fund expenses and for income from investment of technical reserves. Khan does not study incentives for aligning operator and policyholder preferences when their risk attitudes diverge. In Khan's model the operator cannot influence the risk it faces by its choice of the triple $\{n, e_u, k\}$. Risk is therefore irrelevant to the Stage 1 operator optimisation problem.

In Khan's specification, total expense risk is made independent of n:

$$\widetilde{COE} = n(c - ue_u) + \tilde{\varepsilon}_c$$

which means the risk of the takaful fund is invariant to the scale of operations and risk is placed beyond the control of the operator. In practice, the effect of operator decisions on the risk of residual funds is of considerable interest to policyholders. Deviations between the risk attitudes of operator and policyholders can be a source of agency cost.

The model can be improved if, instead of the current specification, expense risk is partly determined by operator decisions. For this purpose, researcher adopts the specification:

$$\widetilde{COE} = n(c - ue_u + \tilde{\varepsilon}_c/\sqrt{n})$$

Aggregate expense risk is $\sigma_c\sqrt{n}$ and average risk per policy $\sigma_c/\sqrt{n}$, retaining the insurance benefits of risk-pooling. Importantly, the operator can now vary expense risk through its decision on the number of policyholders it accepts into the fund, and incentive properties of various compensation forms in relation to fund risk can be examined.

Turning to Khan's assumption on investment risk and expected return, income on investment of the technical reserve ($IITR$) is assumed to be:

$$\widetilde{IITR} = iI + \tilde{\varepsilon}_i$$

Risk is therefore introduced in *levels* of income. This implies that the risk incorporated in the *rate* of income, defined by $\frac{\widetilde{IITR}}{I} = i + \frac{\tilde{\varepsilon}_i}{I}$, can be made as small as desired, merely by boosting investment, a feature incompatible with modern finance, where financial investments, assumed to be traded in perfect capital markets, have identical rates of return for all investors, regardless of the scale of investment.

This study preferred specification, consistent with modern finance, is:

$$\widetilde{IITR} = (i + \tilde{\varepsilon}_i)I \Leftrightarrow \frac{\widetilde{IITR}}{I} = i + \tilde{\varepsilon}_i, \quad I \neq 0$$

Rate of return is now determined by the capital market, independently of the size of the investment, and the operator can influence the total investment risk faced by the fund through the scale of investment, I.

Thirdly, in Khan's model, the operator invests a proportion k of *average* technical reserve. If realised unexpected costs ε_c are sufficiently high so that realised technical reserve is negative, the operator is still permitted to 'invest'. This possibility is ruled out in the study's experiment by requiring the operator to invest only if *realised* technical reserve is positive.

For ease of communicating the experimental environment to subjects, researcher also replaces the Normal distributions for $\tilde{\varepsilon}_c$ and $\tilde{\varepsilon}_i$ with Uniform distributions. Finally, ethical considerations require non-negative payments to experimental subjects. Hence, if $W - C < 0$ in any period, the outcome is deemed to be zero.

Turning now to the testing of gift exchange, researcher does not regard wakalah as an unambiguous gift, since the payment is variable, and conditional on the operator's decision regarding n. Researcher therefore introduces into the mix of operator compensations an unambiguous gift of F, a fixed amount payable unconditionally to the operator. This gift is in the nature of the Islamic concept of *'hibah'*, a transfer of ownership without any corresponding consideration. Thus, this study has:

Hypothesis 12: e_u is increasing in F

H_{12}: The underwriting effort is increasing in the fixed amount payable unconditionally to the operator.

$$\frac{\partial e_u}{\partial F} > 0$$

The following table summarises the differences between the model in Khan (2015a) and the implemented experimental environment.

Table 3 - 1: The differences between the model in Khan (2015a) and the implemented experimental environment.

	Khan (2015a)	Experiment
Operator Costs	$\frac{c_p}{2}n^2 + \frac{1}{2}(ne_u)^2 + \frac{1}{2}I^2$	$\beta_1 n + \beta_2 ne_u + \beta_3 I$
Fund Expenses	$n(c - ue_u) + \tilde{\varepsilon}_c$	$n(c - ue_u + \tilde{\varepsilon}_c/\sqrt{n})$
Investment of Technical Reserve	$I = kn(\gamma_2 + ue_u)$	$I = kn(\gamma_2 + ue_u + \tilde{\varepsilon}_c/\sqrt{n})$
Income on Investment of Technical Reserve	$\widehat{IITR} = iI + \tilde{\varepsilon}_i$	$\widehat{IITR} = (i + \tilde{\varepsilon}_i)I$
Expense Risk	$\tilde{\varepsilon}_c \sim N(0, \sigma_c^2)$	$\tilde{\varepsilon}_c \sim U,\ E(\tilde{\varepsilon}_c) = 0$
Investment Income Risk	$\tilde{\varepsilon}_i \sim N(0, \sigma_i^2)$	$\tilde{\varepsilon}_i \sim U,\ E(\tilde{\varepsilon}_i) = 0$
Non-Negativity Constraint[17]	$E(\widetilde{W}) - C - \frac{1}{2}\phi Var(\widetilde{W}) \geq 0$	$W - C \geq 0$
Gift	$F = 0$	$F \geq 0$

[17] The non-negativity constraint in Khan (2015a) comes from the participation constraint, with reservation utility normalised to zero.

Given these differences, the tests emerging from Khan (2015a) are in the nature of *stress tests* of his model. It is now made clear that the research design is partly deductive, since it tests Khan's predictions. The design is also inductive, because it departs from the environment assumed in Khan's model. It is therefore characterised as a 'stress test': a 'boundary experiment to *discover* the limitations of the theory's application' (Davis & Holt, 1993). The 'stress test' tests the behavioural validity of Khan's model outside the setting in which the model was developed. If any hypotheses are falsified, it shows that they are not robust to changes in the environment.

3.6 Conclusion

The present study adds to the scant evidence on operator incentives by reporting design to investigate the effect on decision making of different forms of compensation, in a setting involving decisions on the size of the pool of policyholders, on cost control, and on investment of technical reserve.

The greater control of data generation offered in a lab experiment means the errors in variables and endogeneity problems in Khan (2015b) are avoided. The drawbacks in Khan (2015a) are also avoided, by specifying an experimental environment in which operator decisions affect the risk of the agency, and in which the agency problem is non-trivial. Thus, this method is adopted in the study and explained below.

CHAPTER 4

RESEARCH METHODOLOGY AND METHOD

4.1 Introduction

This chapter aims to discuss the research methodology and approach used to address the research question formulated during this study. In doing so, specific attention is placed in the following sections on the research methodology and philosophy. In line with this, the empirical procedure used to gather and analyse data is described in order to place it within the context of the chosen research design and methodology.

4.2 Research Methodology and Philosophy

Research methodology is to do with the abstract theoretical assumptions and principles that underpin a particular research approach, often developed within specific scientific or social science disciplines. It guides how a researcher frames the research question, and decides on the process and methods to use (Grant & Giddings, 2002, p. 12). There are three commonly types of approaches to knowledge in research known philosophical research paradigms as follow (Ryan, 2018):

1. Positivism
2. Interpretivism
3. Critical theory

For this study, the researcher uses the positivist approach since it tries to discover how the compensations or performance incentives specified that causes the decisions and the decisions affects welfare of the takaful operator and policyholders. Besides, hypotheses are developed to be proved or disproved based on theory of knowledge embedded in the research of study. For many advocates of positivist, what is posited or given in direct experience is what is observed, the observation in question being scientific observation carried out by way of the scientific method (Crotty, 2004, p. 20). Within a positivist paradigm, knowledge is to be discovered so people (or professions or policy makers) can explain, predict or control events. When such 'facts' or 'evidence' are found through using various experimental or non-experimental methodologies, they are combined to create a specific ‘body of knowledge’ (Grant & Giddings, 2002, p. 14). Positivism is commonly associated with experiments and quantitative research (Ryan, 2018; Grant & Giddings, 2002), it is considered a form of or a progression of empiricism. In other words, positivist approach deals with empiricism that is deal with that can be seen or measured only. Therefore, this study will provide empirical evidence in testing the variables between performance incentives and decision making of takaful operator effect on the welfare of takaful operator and policyholders.

As a positivism study, the role of the researcher is limited to data collections which in this study uses laboratory experiments where strictly positivistic with some room for interpretation (Holden & Lynch, 2004). According to Ang (2014, p. 52), “this approach focuses on using rules of formal logic and hypothetic-deductive logic so that theoretical propositions can survive multiple tests of falsifiability, logical consistency and relative explanatory power.” Therefore, the research findings of the study are usually observable and quantifiable. Few hypotheses are developed to find significant relationship between performance incentives and decision making by takaful operator.

The positivist emphasizes a well-defined structure during the studies conducted; therefore, the theorizing proposed from a positivist approach is then tested using facts (Ang, 2014). Alternative explanation will be further refined if the finding shows that theory does not fit well with the fact, thus making this study more accurate when it comes to experiments and applications. However, dominant representation of what scientific research should do is the mirror where the research should reflect reality. The key issue is to polish the mirror by using as good methods as possible so that misrepresentations are minimised. In summary, this study uses positivist approach of research philosophy where the main objective is to find empirical evidence on how the performance incentives specified in the study that causes the decisions and the decisions affects welfare in Takaful industry.

4.3 Research Design and Strategy

The experiment engages closely with two articles by Khan (2015a, 2015b). It deals with the provision of optimal incentives for agents (takaful operators) from the perspective of standard agency theory and the recent themes of gift-exchange and reciprocity. See Brandts & Charness (2004), Fehr et al. (1998), and Kuang & Moser (2009) for examples from the mainstream literature. The experiment also looks at the specific institutional context of takaful operations, and therefore should be of interest to academics and practitioners working in the area of Islamic finance.

It is now made clear that the research design is partly deductive, since it tests Khan's predictions. The design is also inductive, because it departs from the environment assumed in Khan's model. It is therefore characterised as a 'stress test': a 'boundary experiment to *discover* the limitations of the theory's application' (Davis & Holt, 1993). Based on these, this study characterises the experiment as utilising both inductive and deductive strategies.

This study is designed using a positivist philosophy and it uses experimental research design and quantitative approach. The objective of the study is to investigate how agents are motivated by different contractual forms: wakalah, mudarabah and ji'alah. As experimental research design, this study is able to establish the existence of causal relationship. Causal research focuses on the design of experiments that can be used to directly test X-causes-Y hypotheses resulting in robust and trustworthy data on causes (Bryman, 2004). Data will be analysed using a range of statistical techniques and formal hypotheses testing by statistical inference will be performed to examine the relationship. As an experimental type of research design, the incorporation of controls is important to ensure the validity of data to determine whether a causal relationship exists. Thus, this study is trying to investigate whether contractual forms offered to takaful operators causes better performance (i.e. optimal) to takaful operators.

The researcher first needs to establish some relationships between concepts with the help of theories. In this study, agency theory and gift-exchange theory are used in order to investigate the relationship between financial incentives and performance of the takaful operators. Then, hypotheses are developed to test those relationships using data generated from a laboratory experiment. The test will determine if the hypotheses are supported or not.

The dependent variable that is examined in this study is measured welfare performance. Using the lab experiment, the study focuses on motivating desired behaviour from the agent using the three compensation forms: wakalah, mudarabah and ji'alah. Having specified the experimental environment above, the three treatment variables are

α, m and s and the three response variables (agent decisions) are n, e_u, k which are combined to give the welfare performance to both takaful operator and participants.

Data will be analysed using the Statistical Software namely STATA. Descriptive statistics, t-test, Wilcoxon Signed Ranked Test, Regression analysis, and Kruskal-Wallis test were performed to examine how the performance incentives specified that causes the decisions and the decisions affects welfare. These types of analysis are used to have formal hypotheses testing by statistical inference.

As a positivist approach, it demands a quantitative method. Quantitative method commonly involves large amounts of data. However, the study generates the data from laboratory experiments where the sample basically depends on the budget. This study was funded by Business School of Durham University amounting GBP 2,000. Tentatively, on average, the salient rewards given to experimental subjects could be up to GBP 25 per subject. Thus, it was estimated that the researcher will have 80 subjects from the received funds. During the laboratory experiment, we able to get 79 subjects as the sample for the study. This sample size is considered reasonable as some of the previous studies have had 40 subjects (Sprinkle, 2000), 77 subjects (Brüggen & Moers, 2007; Davis et al., 2006) and 94 subjects (Dobbs & Miller, 2009).

Quantitative research methods are used when general relationship between two or more constructs given a large number of observations needs to establish. General relationships can thus be further examined to create strong relationships depending on the availability of detailed data. In this process, the level of significance of a relationship is quantified. Not only quantitative research methods do help to confirm the relationship, they also help reflect the strength of this relationship. This study develops few hypotheses in order to examine the relationship between performance incentives and the performance (i.e. welfare) of the takaful operator.

4.4 Research Method

The research question, the availability of the sample of the chosen population (subjects), and the intrinsic and extrinsic variables (factors) that need to be controlled to ensure the validity of the design will determine the specific research methodology and methods to be used to test the hypothesis (Grant & Giddings, 2002, p. 15). Based on that, lab experiment was conducted in this research.

A lab experiment is a research method in which practical actions are tried and the results are observed. It involves people called subjects or participants. Researchers design and run experiment and record the results. It is employed to investigate human behaviour observation. The experimenter is in control of data generation, and they are free to use any measurements they like. In a lab experiment, the issue of errors-in-variables brought on by missing data (mudarabah and ji'alah) is avoided. In order to obtain an unbiased estimation result, this study will use a laboratory experiment to produce data and replace the 0 and 1 with real values.

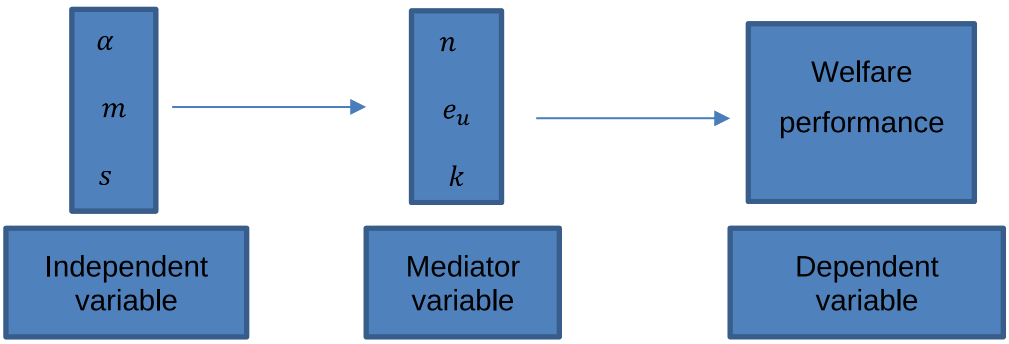
Laboratory experimentation also avoids endogeneity issues. Endogeneity occurs when Variable A (choice of compensation) causes Variable B (agent’s performance i.e surplus) but also Variable B causes Variable A. Khan (2015a) has not taken into account that surplus performance might actually affect the choice of compensation. He therefore didn't allow that in his model. Take wakalah and ji'alah as examples of a choice of compensation plan; researcher believes that they may have an influence on the agent’s performance. But what if the agent's performance has an impact on the decision about wakalah and ji'alah? For instance, the agent may request ji'alah if there was a significant surplus.

According to Khan (2015b) empirical research, wakalah, mudarabah, and ji'alah are exogenous factors that are determined outside of the model and are unaffected by the agent's actions. The study has avoided that because it is true that the choice of wakalah, mudarabah, and ji'alah is outside of the power of the agent; regardless of their performance, they cannot influence that because it is the experimenter, not the subject, who has chosen the values. In the experiment, researcher avoided by not allowing Variable B (performance) to influence Variable A (compensation). It is impossible for performance to influence compensation because it is researcher who has chosen the compensation, not the agent or subject.

Now the study has avoided that in the lab experiment because the research was looking at the effect of the compensation schemes on the actions of the agent. There is no possibility that the agent actions can affect the compensation scheme because the experiment that chooses the compensation scheme independently of the surplus amount – the agent can't choose the compensation. Researcher makes the compensation variables or performance incentives (α for wakalah, m for mudarabah, s for ji'alah and f for fixed salary) genuinely independent of the subject, they are properly independent variables.

In this research, it has two regressions. For subject decision, n, e_u, k are dependent variables where the researcher sees how compensation or performance incentives (α, m , s) effects on decisions. However, in other regression analysis for performance metrics, n, e_u, k becomes mediator variable between compensation and welfare performance. And for this, n, e_u, k are mediator variables and welfare performance as a dependent variable. Therefore, it can be said that the variables $\{n, e_u, k\}$ mediate the relationship between the set $\{\alpha, m, s\}$ and the welfare performance of the operator and of the participants. The welfare measures the total cash inflow to the agency, which is both agent (W, operator compensation) and principal (Xp, net surplus on the fund after operator compensation). It is because, in order to have a Pareto gain, one party should be better off without making another party worse off.

Diagram 4 - 1: Conceptual framework of the study.



Therefore, lab experiment is used as it is a method of a search which try practical activities and observe what happens. It involves subjects. Researchers design and run experiment and record the results. It is used to explore observation of human behaviour. The above framework is intended to investigate how the compensation specified $\{\alpha, m, s\}$ that causes the subject decisions $\{n, e_u, k\}$ and how such decisions cause the welfare performance.

4.4.1 Data Collection Method

A lab experiment is a scientific investigation, using organic subjects, in which independent variables are manipulated and their effects on dependent variables observed. It should be distinguished from computer simulation, which is used to explore properties of theoretical models, and which does not use observations of human behaviour. With computer simulation, there is no possibility of falsifying a theoretical model, whereas in lab experiments involving human subjects, a theoretical model may be falsified. The high degree of control over independent variables allows the testing of causal hypotheses. The general purpose is to try practical activities and observe what happens: researchers design and run experiments to study an isolated piece of the world and record the results.

The specific purposes of the present work are:

a) To test the empirical validity of predictions derived from Khan (2015a).
b) To discover empirical regularities between forms of compensation (the independent variables) and agent behaviour and various measures of performance (the dependent variables).
c) To guide public policy decisions by regulators.

Study of an isolated piece of the world is quite deliberate. Breaking a problem up into its components facilitates both deeper and clearer study, free from confounding influences, just as experiments by Galileo, leading up to the formulation of the Law of Inertia, were designed to eliminate, as far as possible, the influence of friction.[18] He wanted to study the behaviour of the ball without resistance, so this is relevant to where this research is studying an isolated piece of the world and that's quite deliberate.

The greater control of data generation offered in a lab experiment means the errors-in-variables problem caused by missing non-experimental data and the endogeneity problems in Khan (2015b) are both avoided[19].

[18] Since researcher has (deliberately) not created the specific theoretical environment in Khan (2015a), the present study tests are in the nature of stress tests, outside the theoretical domain of Khan (2015a). We also provide tests for the presence of reciprocal gift exchange, using a clearer conceptualisation of 'gift', namely *hibah*, than was advanced in Khan (2015b).
[19] For general discussions on the advantages of using laboratory experimentation, readers may see Roth (1987), Roth (1988), Plott (1991) and Sprinkle (2003).

An issue that is often raised in connection with lab experiments is ‘external validity’, the degree to which conclusions can be generalised from the tasks, environment and participants of the experiment to naturally-occurring situations. Because there are many people who are sceptical about the value of experiments. They emphasize this problem and refer to it as external validity. They claim that because a lab experiment is artificial, the conclusions you draw from your study does not have any bearing on the natural occurring world. That is what they say and they don’t generalise. But this issue is equally pertinent to other research methods. And it is not unique. Even many studies employ real data. You have got a sample and you can’t be certain that the results from your research can be generalised with different sample or different sample period. So, the issue is the same for any study.

The advantage of lab experiments is that they can be easily repeated, with variation in tasks, environment and participants, to test the robustness of conclusions. For example, can an econometric study of UK households over a period of time be generalised to other countries or other sample periods? If you have a doubt about the relevance of students’ behaviour, then you can conduct another study, but this time the subject was a takaful operator. So that’s the benefit of experiments where you can replicate the study.

In this experiment, subjects were drawn from a pool of university undergraduate and postgraduate students. Does their observed behaviour generalise to the population in a naturally-occurring situation? There is little evidence that they do not. Smith et al. (1988) found that the behaviours of students and professionals did not differ significantly in laboratory experiments. Burns (1985) also observed that professionals attempted to apply ‘meaningless’ rules of thumb, whereas students did not.[20]

Subjects were recruited from the student population at Durham University, because students have a lower opportunity cost than professionals. Subjects are (unwittingly) playing the role of top executives in charge of decision making. The preferences of top executives are prohibitively expensive to control. Besides, salience is more difficult to establish with the professionals. This is because £30 for a student may mean nothing to a professional. You would get students to come and do the experiments for £30, whereas

[20] In Burns’s (1985) study, the experimenter did not control beliefs, so students and professionals brought different beliefs to the experiment. An abstract presentation of the environment, without reference points to naturally-occurring markets is therefore recommended.

this unlikely to get takaful operator to do anything for £30. That's why salience is easier to achieve for a given sample used.

Additionally, students are lack exposure to confounding reference points. Confounding reference point refers to mixing up or confusing because you don't know what these subjects bring into the experiment, if you haven't controlled beliefs on preferences with professionals. They might hold a belief that you don't want them to, or they might have a preference for something that you don't intend to.

They also have steep learning curve, meaning that they learn quickly. If researcher selects business professionals (i.e. traders), the expertise that business professionals possess may contradict the current research design requirements as business professionals will struggle to adjust to a new frame of reference. The experiment is *not* presented to subjects in a takaful or insurance context. An abstract presentation facilitates control of beliefs, since uncontrolled customs and conventions of behavior from a takaful business context do not operate. Therefore, utilising students as subjects is the pragmatic approach to laboratory experiment, given the need to control preferences and beliefs of subjects in order to facilitate interpretation of the resulting data.

4.4.1.1 Moral Hazard Evidence in Lab Experiments

The focus on moral hazard in lab experiments has been on two questions:

a) do agents behave self-interestedly?

b) do financial rewards based on performance mitigate agency problems?

On the first question, experimental evidence suggests individuals behave non-cooperatively when outcomes are fully insured. On the second question, some experimental evidence finds that providing explicit financial incentives can correct moral hazard problems. According to Sprinkle (2003), only 50% of experiments demonstrate positive effects on task performance from providing performance-related rewards. In this regard, individual skill, task complexity and type of incentive appear to interact with the provision of performance-related rewards. Framing also seems to matter: experimental subjects prefer incentives to be framed in terms of bonuses rather than economically-equivalent penalties. These incentives can induce enhanced levels of effort and performance in experimental subjects, but the results are not uniform.

On gift exchange, Brandts & Charness (2004) find that effort is positively related to a flat wage, in both repeated and one-shot labour markets. Fehr et al. (1998) report similar results but Kuang & Moser (2009) find that an optimal agency contract performs better than gift exchange[21]. There is no previous experimental research along the lines of the present study, which examines incentives in a 3-task setting[22].

4.4.1.2 Methodological Considerations

There are two different traditions commonly used by accounting researchers when performing experiments: psychology, and economics. The researcher adopts the economics tradition, which emphasises four principles, in contrast to the psychology tradition.

First, there are detailed formal written instructions to brief subjects on the tasks and payoffs. Psychologists are relatively casual when issuing instructions and seldom use written instructions. In contrast, economists hand out written instructions and/or read them aloud in order to brief subjects. This practice facilitates replication by other researchers, and also minimises conscious or unconscious unreported manipulation of subject beliefs that would make interpretation of the resulting data ambiguous. Recognition of the latter problem led to the recommendation that experimental trials should be double blind. For example, in Rosenthal & Fode (1963), experimenters who were falsely told their rat subjects were either experienced or inexperienced at running a maze, when in fact the rats were randomly assigned, reported results that reflected what they were told. Palfrey & Porter (1991) provide detail best practice on the documentation and reporting of experimental instructions and procedures.

Second, economists use repetition of trials, in order to examine convergence of behaviour. Psychologists often use a single trial. Economists prefer to use data collected *after* subjects have become accustomed to the experimental task, on the grounds that subject preferences when confronted with *de novo* problems take experience in order to form. Getting subjects to perform multiple trials also economises on experimental overhead.

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[21] When a menu of contracts was available to the principal, a hybrid contract that included gift exchange was better in terms of welfare (Kuang & Moser, 2009).
[22] See Brüggen & Moers (2007) for an experimental investigation of a two-task agency model.

Third, economists attempt to control the preferences of subjects by means of salient payments based on ‘performance’. Riecken (1962) discusses the complex intrinsic motivations of volunteer subjects in a lab experiment. If these motivations are obscure, the resulting data becomes difficult to interpret. The provision of salient extrinsic payments allows the experimenter to take control of these motivations[23]. Psychologists, if they make payments to subjects at all, generally give a flat reward for participation, unrelated to ‘performance’.

Lastly, economists mostly avoid the use of deception when briefing subjects, whereas a large proportion of experiments in social psychology use deception to mislead subjects about the task or environment. Deception is generally disapproved in economics. A number of studies have identified problems with the use of deception, including Kelman (1967), Orne & Holland (1968), Riecken (1962), and Rosenthal (1963). The following arguments have been made against the use of deception. Firstly, there is a moral issue connected with the lack of informed consent when deception is used. Secondly, the discarding of data from subjects who were suspicious of the deception leaves generalisations from the research being relevant only to the most gullible. Finally, a reputation for use of deception might mean that in future experimenters are not able to control beliefs, because of a lack of trust in their instructions. Hence, avoiding the use of deception has public good qualities that affect the validity of experiments for all researchers. It is almost always the case that alternative procedures can be adopted in place of the use of deception.

4.4.1.3 Recruitment Details for Present Study

Computerisation of the experiment facilitated standardised presentation of the environment to subjects. It also reduced the cost of, and improved the quality of, data recording, and removed undesirable communication between subjects; and between subject and experimenter. Once the experiment began, interaction was restricted to a computer terminal and a subject, remotely situated from other subjects. The experiment was programmed using z-Tree (Zurich Toolbox for Ready-made Economic Experiments), a free software developed by Fischbacher (2007).

[23] For method of provision, both under certainty and uncertainty, see Smith (1976), Berg et al. (1986), and Dobbs & Miller (2014).

The research budget was provided by of Durham University Business School. There is a trade-off between research budget and sample size/salience of subject payments. Subjects were recruited from the student population at Durham University, because students have a lower opportunity cost than professionals, so that salience is easier to achieve for a given sample size. Students also lack exposure to confounding reference points. They also have steep learning curves, meaning that they learn quickly.

4.4.2 Data Collection: Research Design and Organisation of Experimental Session

In this subsection, it discusses how the research design and organisation of experimental session was conducted.

4.4.2.1 Exogenous Parameters, Treatment Variables and Response Variables

The researcher first needs to establish some relationships between concepts with the help of theories. In this study, agency theory and gift exchange theory are used in order to investigate the relationship between financial incentives and performance of the takaful companies. Then, hypotheses are developed as in Chapter 3 to test those relationships using data generated from a laboratory experiment. The test will determine if the hypotheses are supported or not.

The following exogenous parameter values were assigned in the experiment:

1) Revenue per customer: $p = 100$
2) Sensitivity of fund expenses to operator effort: $u = 1$
3) Average fund expenses with zero operator effort: $c = 90$
4) Average return on investment: $i = 0.12$
5) Operator cost function: $C = 5n + 0.5ne_u + 0.02I$
6) Distributions of unexpected fund expenses and unexpected return on investment: $\tilde{\varepsilon}_c \sim U(-30, +30), \tilde{\varepsilon}_i \sim U(-0.15, +0.15)$

The zero-effort expected operating cost c is set at 90, close to the premium of 100, so that there is a risk of losses if there is *no* attempt to control costs, more so when wakalah is paid. This sets up a conflict of interest between principal (P) and agent (A) over operator effort if the operator does not participate in the gains from reducing operating cost. The personal cost of bringing in customers is 5 per customer, less than the wakalah benefit to the operator. However, costs rise when effort is supplied, up to a maximum of $(5 + 0.5e_u)$ per customer. Unexpected fund expenses and unexpected returns are independent. If no operator effort is supplied, fund expenses can range between 120 (a loss, even with no wakalah) and 60. Returns on investment vary between -0.03 and 0.27.

Treatment variables each took on 2 values, which we classify as 'Low' and 'High':

Table 4 - 1: Values of each treatment variable

	$\boldsymbol{\alpha}$	$\boldsymbol{m}$	$\boldsymbol{s}$	$\boldsymbol{F}$
Low (L)	0.15	0.10	0.10	0
High (H)	0.30	0.50	0.50	1,000

The low and high values chosen for wakalah, mudarabah and ji'alah followed industry practice, revealed by examination of annual reports of takaful companies and in accordance with the 2010 Guidelines on Takaful Operational Framework issued by Bank Negara Malaysia (see Mokhtar et al., 2015; ISRA, 2012). The objective in choosing large differences for each parameter was to give the best chance of detecting the effects on response variables of shifting incentives.

A 'treatment' is a combination of values for the four treatment variables, identified by number and by an ordered quadruplet (α, m, s, F). For example, LHHL denotes the treatment with $\alpha = 0.15,\ m = 0.5,\ s = 0.5,\ F = 0$.

The relationship between treatment number and ordered quadruplet is shown in the following table:

Table 4 - 2: Treatment number and ordered quadruplet.

Treatment	Treatment variables
T1	LLLL
T2	HLLL
T3	LHLL
T4	LLHL
T5	LLLH
T6	HHLL
T7	HLHL
T8	LHHL
T9	HHHL

All $2^3 = 8$ combinations of wakalah, mudarabah and ji'alah are represented by separate treatments, in order to test interaction effects between incentives. There is one further treatment to test the gift exchange hypothesis when all other incentives are weak (T5: LLLH), giving a total of 9 treatments.

The response variables and their permissible values were:

1) $n \in \{0, 1, 2, \ldots, 99, 100\}$
2) $e_u \in \{0, 1, 2, \ldots, 49, 50\}$
3) $k \in \{0, 0.1, 0.2, \ldots 4.9, 5.0\}$

The performance variables were:

1) The total amount of effort supplied by a subject, proxied by the operator costs: $C = 5n + 0.5ne_u + 0.02I$
2) The mix of values for n, e_u, k, which mediate the effects of incentives on the overall welfare of the operator and participants.
3) Total cash inflow to the agency, $W + x_p$, its breakdown across the two parties, W and X_p, net surplus to the fund per participant, X_p/n, and aggregate welfare of all

participants and of each, assuming risk aversion, using a natural logarithmic utility function, $\ln X_p$ and $\ln X_p/n$.

The mix of values for $n,\ e_u, k$ also proxy the mix of effort by a subject.[24]

4.4.2.2 Within-Subjects Design, the Order Effect and Stability Issues

To control variation in subject characteristics across treatments, each subject participated in all 9 treatments, a 'within-subjects' research design. To fully examine whether the sequential order of treatments affected observed outcomes, the sequence would have to be systematically varied and outcomes tested for significant differences. For example, if there were 2 treatments, $2! = 2$ sequences would have to be presented to subjects.

In this experiment there are 9 treatments and therefore $9! = 362{,}880$ different possible permutations, rendering the above approach for testing order effects infeasible. A feasible approach is to examine whether the average value of a response variable is sensitive to the *position* of the treatment in the sequence.[25]

Each subject received one of 16 randomly pre-determined sequences of treatments. For each treatment, the researcher then tested for differences across the nine positions, P1…P9, treated as independent dummy variables. For example, for treatment 1, the researcher takes the averages for the 9 sub-samples involving treatment 1 in positions 1-9 in the sequence, and then test for differences. The sequences are set out in the following table.

[24] There is a case for also reporting $W - C + X_p$, and $W - C$.

[25] Focusing on position of a given treatment ignores permutations of other treatments around that position, yet it gives a feasible test. If there is a position effect, there is also an order effect. However, if there is no position effect, there may still be an order effect. The proposed procedure is therefore capable of finding certain kinds of order effects, but not all. Take an example with 3 treatments, A, B and C. There are $3! = 6$ permutations: ABC, ACB, BAC, BCA, CAB and CBA. The position approach would test for significant differences between, for example, the average of ABC and ACB, and the average of BAC and CAB, ignoring the different orders of treatments B and C.

Table 4 - 3: The treatment sequence and number of sample observations.

Treatment sequence	Number of sample observations
T2, T3, T5, T4, T7, T1, T9, T6, T8	7
T5, T1, T2, T9, T3, T8, T6, T7, T4	6
T3, T7, T4, T5, T8, T9, T6, T2, T1	6
T6, T3, T7, T4, T8, T1, T5, T9, T2	5
T5, T7, T2, T6, T3, T1, T9, T4, T8	6
T7, T2, T6, T8, T4, T1, T3, T5, T9	7
T4, T1, T5, T3, T2, T6, T9, T7, T8	7
T4, T2, T5, T1, T7, T3, T6, T8, T9	5
T7, T6, T2, T8, T9, T4, T1, T3, T5	4
T9, T5, T8, T2, T1, T7, T3, T4, T6	4
T3, T4, T6, T1, T2, T8, T9, T7, T5	6
T8, T9, T7, T4, T3, T2, T6, T5, T1	6
T6, T5, T9, T7, T8, T2, T3, T1, T4	5
T9, T1, T3, T4, T6, T2, T5, T8, T7	1
T3, T8, T5, T4, T2, T6, T1, T7, T9	2
T8, T5, T1, T9, T4, T2, T6, T7, T3	2
Total	79

Treatments with nil sample observations in certain positions are recorded in the right hand column of the following table: such position variables were omitted from the analyses of the corresponding treatments. Position variables with significant effects were included in the main analyses of incentives to control for the order effect.

Table 4 - 4: Treatments with nil sample observations in certain positions.

Treatment	Remark
T1	No sample observation in P1
T2	No sample observation in P7
T3	-
T4	No sample observation in P7
T5	No sample observations in P5 and P6
T6	-
T7	No sample observation in P7
T8	No sample observation in P7
T9	-

Administering repetitive decision periods allows subject learning, so subject behaviour might converge to a stable pattern for analysis. In the present experiment, subjects responded to 6 consecutive trials[26] for each of the 9 treatments, giving 54 decision periods. Therefore, a rational behaviour from the subjects is attained through these consecutive trials. Stability was examined by comparing average response variables over the first 3 and the last 3 trials. Results of the main tests are reported for the final 3 trials in each treatment, as well as for all 6 trials in an appendix.

4.4.2.3 Rewards and Experimental Procedures

The experiment was run over 7 sessions. The experimental sessions were conducted at Durham University, United Kingdom. The sessions took place in IT Rooms at Mill Hill Lane, Durham University Business School before the Easter break in March 2019.

[26] In the first pilot, the decision making of the respondents did not settle down by the end of 5 consecutive decision periods. Later we set 6 consecutive decision periods in the second pilot and the decision making of volunteer subjects settled down with this set number of trials for each treatment.

Before each experimental session was started, registration of attendance was marked. Each session consisted of eight to fifteen participants. Subjects sat at computer terminals, situated remotely to prevent communication. The only clarifications subjects could seek from the instructor were those concerning use of software in the computer room. No communication was allowed between subjects.

Each subject had access to a printed set of instructions, pen, paper and calculator. The instructions had to be handed in at the end of session. They are provided here as an Appendix 6. At the start of each session, the instructions were read out aloud by the experimenter. These instructions include a broad statement of the purpose of the experiment, to investigate the decisions people make in response to different forms of compensation; a clear definition of the experimental task, how the success of the business organization is measured; the set of choices and actions available to them, what tasks are required from the subject; and most important, the rules for determining the earnings of individual subjects, the costs and rewards that will occur.

A subject was then required to complete correctly a series of questions in a spreadsheet, and then respond to 6 practice periods, covering 2 treatments, to familiarise the participants with the experiment. The questionnaire is included as an Appendix 7. The subjects were told in advance that the 6 practice periods did not give rise to earnings. No subject was allowed to continue on to the experiment until the above requirements had been met.

The experiment was programmed and conducted with the experiment software z-Tree (Fischbacher, 2007).[27] In each decision period of the experiment, subjects were notified of $\{\alpha, m, s, F\}$[28] on the computer screen together with the personal costs for every decision. They were then asked to input their decisions on $\{n, e_u, k\}$.[29] Finally, an account, showing individual earnings, $(W - C)$[30] was then displayed. The profit, x_p, of the business was displayed for the information of the subject. Cumulative personal earnings was shown each time subject earnings for a decision period was calculated.

[27] A selection of screenshots is reproduced in Appendix 8 to illustrate what each participant would have seen on the screen at various points during the experiment.
[28] Renamed as rewards A, B, C and D on the computer screen.
[29] Here, the subjects were asked to input the decisions concerning the three required tasks.
[30] Sum of Rewards A, B, C and D less the subject's personal costs.

When a subject finished the experiment, s/he raised her/his hand and an instructor attended to the final procedures and paperwork. A summary of the subject's earnings in 'francs', the notional experimental currency, appeared on the computer screen and was transferred to paper. The instructor recorded the earnings of the subject on a 'Statement of earnings'. This 'Statement of earnings' can be seen in an Appendix 9. Earnings in francs was converted into pounds sterling at the rate of 0.02 pence per franc. The subject signed a document to verify her/his earnings and a copy was given to the participant. Earnings were paid a few days after the experiments had been concluded.[31]

4.5 Conclusion

Takaful industry has been developing in recent years rapidly. Being established as a vital mechanism in financial industry especially in Muslim countries it is important to look at the aspects that make it so viable and worthy alternative to conventional insurance. This research study aims to supply empirical evidence on the relative efficiencies of some common forms of agent compensation for the purpose of improving overall efficiency. The research method that was used which is positivist approach (i.e. quantitative method using lab experiment) is the best fit and appropriate method that can answer the research questions.

[31] The experiment was funded by Durham University Business School.

CHAPTER 5

PRESENTATION AND DISCUSSION OF FINDINGS

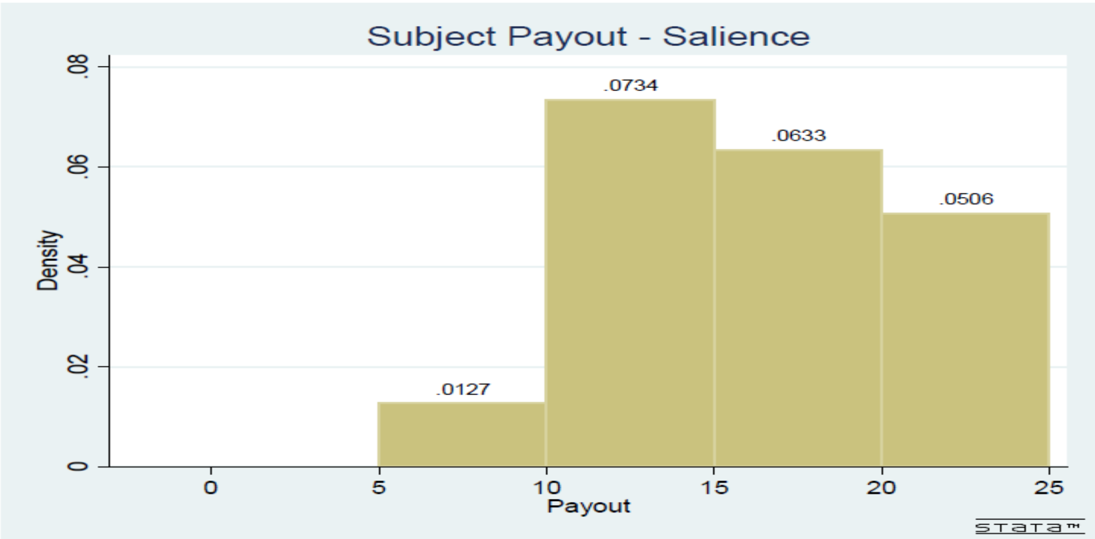
5.1 Introduction

This study starts with a goal to supply empirical evidence on the relative efficiencies of some common forms of agent compensation, namely sales commission (wakalah), sharing of investment profit (mudarabah), and sharing of residual funds (ji'alah) for the purpose of improving overall efficiency. The present study reports results from a laboratory experiment, designed to investigate the effect on decision making of different forms of compensation, in a multi-task setting involving decisions on the size of the pool of policyholders, cost control, and investment of technical reserve.

5.2 Descriptive Statistics

Descriptive findings on the experiment, namely the demographic data is presented. The histogram of subject payout is shown below.

Diagram 5 - 1: The histogram of subject payout.



Variable	Obs	Mean	Std. Dev.	Min	Max
payout	79	15.9935	4.007733	6.968195	22.2

The average payout to subjects was £15.99. The minimum and maximum were £6.97 and £22.20 respectively.

Invitations to participate were made at the beginning of lecturers and by circulating emails. The researcher received a total of 99 volunteers who showed interest in participating. A 'Personal Details Form' provided details on degree course and level, age, gender, nationality, experience with experimentation; and email address. The researcher notified the volunteers by email of their individual session dates and times at least two days in advance. The PowerPoint presentation given during lectures, the email inviting participation, a form requesting personal details to be used as control variables, the email assigning volunteers to experimental sessions, and the consent form used for use of subject data are included here as Appendix 1 to 5 respectively. The experiment was run over 7 sessions in March 2019, with between-session communication regarding the experiment prohibited in the instructions.[32] The sample size was 79. The remaining 20 volunteers did not turn up during their sessions.

Data on personal characteristics of subjects were requested and used as control variables in the analysis. The tables below provide frequency tables of the six personal characteristic variables.

Table 5 - 1: Frequency table for personal characteristic variable of courses.

Course_label	Freq.	Percent
Business School	53	67.09
Dept. of Engineering	7	8.86
Dept. of Law	5	6.33
Dept. of Sciences	5	6.33
Dept. History	4	5.06
Dept. Social Sciences	2	2.53
Dept. of Arts	2	2.53
N/A	1	1.27
Total	79	100.00

53 subjects (67%) were from Durham University Business School. The remaining 26 subjects (33%) came from other schools/departments.

[32] Two pilot studies were conducted to ensure the environment was clearly presented. No data analysis was performed on these pilot studies. They therefore do not suffer from the selective reporting of data discussed in Roth (1994). The researcher manages to conduct two pilot studies to ensure there were no unforeseen procedural problems.

Table 5 - 2: Frequency table for personal characteristic variable of education.

Education	Freq.	Percent
Bachelors	39	49.37
PhD	19	24.05
Masters	18	22.78
N/A	3	3.80
Total	79	100.00

There were 39 Bachelor's students (49%), 19 PhD students (24%), and 18 Master students (23%).

Table 5 - 3: Frequency table for personal characteristic variable of ages.

Age_group	Freq.	Percent
16 - 20	35	44.30
21 - 25	20	25.32
26 - 30	13	16.46
31 - 35	4	5.06
36 - 40	4	5.06
41 - 45	3	3.80
Total	79	100.00

Age is broken down into categories of 5-year groupings. Thirty-five subjects (44%) were from 16 to 20 years old, and the remaining 44 subjects (56%) were age 21 to 45 years old.

Table 5 - 4: Frequency table for personal characteristic variable of sex.

Sex	Freq.	Percent
Male	40	50.63
Female	39	49.37
Total	79	100.00

There were 40 males (51%) and 39 females (49%) in the sample analysis.

Table 5 - 5: Frequency table for personal characteristic variable of experience.

Experience	Freq.	Percent
No	59	74.68
Yes	20	25.32
Total	79	100.00

The table above indicates most of our sample, 59 subjects (75%) have not been involved in any experiments before. Only 20 subjects (25%) have.

Table 5 - 6: Frequency table for personal characteristic variable of nationality.

Nationality	Freq.	Percent
British	28	35.44
Indonesian	13	16.46
Chinese	9	11.39
Malaysian	9	11.39
Turkish	3	3.80
Cypriot	2	2.53
English	2	2.53
Indian	2	2.53
Bulgarian	1	1.27
Germany	1	1.27
Hong Kong	1	1.27
Italian	1	1.27
Nigerian	1	1.27
Pakistani	1	1.27
Saudi	1	1.27
Slovene	1	1.27
South Korean	1	1.27
Taiwan	1	1.27
Turkey	1	1.27
Total	79	100.00

The above shows that 35% (28 subjects) were British and 65% (51 subjects) were from other nationalities.

5.3 Stability and Convergence

A measure is said to possess stability if you can secure consistent results with repeated measurements of the same subject with the same instrument (Cooper & Schindler, 2008, p. 293). Stability in experiment means when the subjects do not change the decision. Therefore, the researcher creates 6 periods or 6 trials for each treatment. It should find that the average of differences becomes smaller as they move through from 1 to 6 periods. So, the researcher is looking for the differences in consecutive periods are reducing. They may not go to zero, but may reduce. Then, the researcher brings averaging across subjects as well. The study did find the average for the first 3 and the last 3, and that allows to identify whether stability is affected by the treatment.

In the experiment, for each response variable (n, e_u, k), treatment (T1,…,T9), and subject ($i = 1, \ldots$,79), this study has 6 consecutive observations, denoted $\delta_1, \ldots, \delta_6$. To examine the tendency of subject decisions to converge to stable levels, the researcher formed absolute differences between consecutive decisions:

$$|\delta_t - \delta_{t-1}|,\ t = 2, \ldots, 6$$

For ease of interpretation, the differences were then scaled by the range of permissible values and expressed as percentages.

$$\Delta_t^n \equiv \frac{|\delta_t - \delta_{t-1}|}{100 - 0} \times 100 = |\delta_t - \delta_{t-1}|$$

$$\Delta_t^{e_u} \equiv \frac{|\delta_t - \delta_{t-1}|}{50 - 0} \times 100 = 2|\delta_t - \delta_{t-1}|$$

$$\Delta_t^k \equiv \frac{|\delta_t - \delta_{t-1}|}{0.5 - 0} \times 100 = 200|\delta_t - \delta_{t-1}|$$

Finally, the researcher averaged over subjects to give $\overline{\Delta}_t$ for each response variable and treatment. This gives the study five average absolute changes between periods for each treatment. The researcher can track whether the average absolute change falls during the course of each treatment. If subject decisions converge to a relatively stable level, the researcher should find that average absolute differences decline as they move through $t = 2, \ldots$,6.

For T1 = LLLL, $\overline{\Delta}_t$ are:

Table 5 - 7: The average absolute percentage changes between periods for each variable for T1.

t	n	e_u	k

2	11.9	16.8	22.0
3	12.1	20.1	22.5
4	11.0	18.2	25.6
5	11.2	17.4	26.6
6	9.1	18.0	21.8

The results show that convergence for each response variable, n, e_u and $k,$ for T1, LLLL, is present but not monotonic. Average absolute percentage differences tend to decline as we move through $t = 2, \dots, 6$.

For T1 = LLLL, $\frac{\bar{\Delta}_2+\bar{\Delta}_3}{2}$ and $\frac{\bar{\Delta}_5+\bar{\Delta}_6}{2}$ are:

Table 5 - 8: The average of the first and last two scaled absolute percentage differences, t-test and Wilcoxon Signed Ranked Test result for T1.

Average	$\boldsymbol{n}$	$\boldsymbol{e_u}$	$\boldsymbol{k}$
$t = 2,3$	12.0	18.5	22.3
$t = 5,6$	10.2	17.7	24.2
t-test	-	-	-
Wilcoxon	-	-	-

The average of the last two scaled absolute percentage differences is smaller than the first two for n and e_u. The researcher can test whether the declining differences in responses, comparing early and late responses in a treatment, are significant. The researcher uses a one-tailed test, since the alternative hypothesis is signed. The researcher would expect the last two to have a lower average than the first two.

t-test (parametric test) is more powerful at detecting effects than the non-parametric test (Wilcoxon Signed Ranked test). But t-test relies on assumptions. If the assumptions were valid, you would use t-test. If the assumptions are not valid, then t-test is not appropriate and you might choose a weaker tool, such as non-parametric. Non-parametric test itself less powerful but more general. Because it does not rely on so many assumptions, so it applies to more cases. In this study, the researcher did both.

The researcher used the repeated measures t-test that the differences between late and early average absolute percentage differences for the 79 subjects had a negative mean. The researcher also used the Wilcoxon Signed Ranked Test on the scaled percentage differences per period over periods 1-3 and periods 4-6 for the 79 subjects, in each treatment and for each response variable, to test the null hypothesis that the data came from the same distribution, against the alternative hypothesis that the later average is lower than the earlier average. The significance of the decrease is indicated by asterisks: * 10%; ** 5%; *** 1%; and – for no significance. Thus, no statistically significant difference between the mean of the two groups was found in the Wilcoxon test for T1 as shown in Table 5 - 8.

For T2 = HLLL, $\overline{\Delta}_t$ are:

Table 5 - 9: The average absolute percentage changes between periods for each variable for T2.

$\boldsymbol{t}$	$\boldsymbol{n}$	$\boldsymbol{e_u}$	$\boldsymbol{k}$
2	8.0	18.0	21.0
3	7.8	16.8	14.7
4	5.9	10.9	11.1
5	4.7	11.3	11.4
6	4.8	9.2	12.4

The results show that convergence for each response variable, n, e_u and $k,$ for T2 is present but not monotonic. Average absolute percentage differences decline as we move through $t = 2, \ldots, 6$.

For T2 = HLLL, $\frac{\bar{\Delta}_2+\bar{\Delta}_3}{2}$ and $\frac{\bar{\Delta}_5+\bar{\Delta}_6}{2}$ are:

Table 5 - 10: The average of the first and last two scaled absolute percentage differences, t-test and Wilcoxon Signed Ranked Test result for T2.

Average	$\boldsymbol{n}$	$\boldsymbol{e_u}$	$\boldsymbol{k}$
$t = 2,3$	7.9	17.4	17.8
$t = 5,6$	4.8	10.2	11.9
t-test	**	***	*
Wilcoxon	**	***	**

The average of the last two scaled absolute differences is smaller than the first two for all response variables. The results show that the declining differences, comparing early and late responses are significant.

For T3 = LHLL, $\bar{\Delta}_t$ are:

Table 5 - 11: The average absolute percentage changes between periods for each variable for T3.

$\boldsymbol{t}$	$\boldsymbol{n}$	$\boldsymbol{e_u}$	$\boldsymbol{k}$
2	19.1	32.0	33.7
3	13.3	21.8	33.2
4	11.9	18.7	21.5
5	12.3	15.6	23.5
6	10.6	15.2	22.8

Convergence is not monotonic, except for e_u.

For T3 = LHLL, $\frac{\bar{\Delta}_2+\bar{\Delta}_3}{2}$ and $\frac{\bar{\Delta}_5+\bar{\Delta}_6}{2}$ are:

Table 5 - 12: The average of the first and last two scaled absolute percentage differences, t-test and Wilcoxon Signed Ranked Test result for T3.

Average	$\boldsymbol{n}$	$\boldsymbol{e_u}$	$\boldsymbol{k}$
$t = 2,3$	16.2	26.9	33.4
$t = 5,6$	11.5	15.4	23.2
t-test	**	***	***
Wilcoxon	*	***	**

The average of the last two scaled absolute differences is significantly smaller than the first two for all response variables.

For T4 = LLHL, $\bar{\Delta}_t$ are:

Table 5 - 13: The average absolute percentage changes between periods for each variable for T4.

$\boldsymbol{t}$	$\boldsymbol{n}$	$\boldsymbol{e_u}$	$\boldsymbol{k}$
2	11.4	20.0	19.0
3	9.6	18.5	23.0
4	10.6	18.1	24.1
5	8.3	17.7	18.2
6	6.5	17.4	21.3

The results show that convergence is not monotonic, except for e_u.

For T4 = LLHL, $\frac{\overline{\Delta}_2+\overline{\Delta}_3}{2}$ and $\frac{\overline{\Delta}_5+\overline{\Delta}_6}{2}$ are:

Table 5 - 14: The average of the first and last two scaled absolute percentage differences, t-test and Wilcoxon Signed Ranked Test result for T4.

Average	$\boldsymbol{n}$	$\boldsymbol{e_u}$	$\boldsymbol{k}$
$t = 2,3$	10.5	19.3	21.0
$t = 5,6$	7.4	17.6	19.7
t-test	**	-	-
Wilcoxon	*	-	-

The average of the last two scaled absolute percentage differences is smaller than the first two for all response variables. Here it could say that the results show the declining differences are significant for n only. No statistically significant difference between the mean of the two groups was found for e_u and k.

For T5 = LLLH, $\overline{\Delta}_t$ are:

Table 5 - 15: The average absolute percentage changes between periods for each variable for T5.

$\boldsymbol{t}$	$\boldsymbol{n}$	$\boldsymbol{e_u}$	$\boldsymbol{k}$
2	12.4	17.0	21.5
3	10.9	21.4	21.8
4	10.3	15.5	18.7
5	7.3	10.0	17.2
6	10.2	13.2	16.7

The results show that convergence for each response variable, n, e_u and $k,$ for T5 is not monotonic.

For T5 = LLLH, $\frac{\bar{\Delta}_2+\bar{\Delta}_3}{2}$ and $\frac{\bar{\Delta}_5+\bar{\Delta}_6}{2}$ are:

Table 5 - 16: The average of the first and last two scaled absolute percentage differences, t-test and Wilcoxon Signed Ranked Test result for T5.

Average	$\boldsymbol{n}$	$\boldsymbol{e_u}$	$\boldsymbol{k}$
$t = 2,3$	11.7	19.2	21.6
$t = 5,6$	8.7	11.6	17.0
t-test	-	***	*
Wilcoxon	*	**	**

The average of the last two scaled absolute percentage differences is smaller than the first two for all response variables. The results show that the declining differences in responses are significant.

For T6 = HHLL, $\bar{\Delta}_t$ are:

Table 5 - 17: The average absolute percentage changes between periods for each variable for T6.

$\boldsymbol{t}$	$\boldsymbol{n}$	$\boldsymbol{e_u}$	$\boldsymbol{k}$
2	6.2	22.0	31.1
3	6.3	14.2	22.8
4	4.1	14.7	15.4
5	4.5	13.4	19.7
6	5.3	12.0	14.7

The convergence of average absolute changes between periods for each variable for T6 is not monotonic.

For T6 = HHLL, $\frac{\bar{\Delta}_2+\bar{\Delta}_3}{2}$ and $\frac{\bar{\Delta}_5+\bar{\Delta}_6}{2}$ are:

Table 5 - 18: The average of the first and last two scaled absolute percentage differences, t-test and Wilcoxon Signed Ranked Test result for T6.

Average	$\boldsymbol{n}$	$\boldsymbol{e_u}$	$\boldsymbol{k}$
$t = 2{,}3$	6.3	18.1	27.0
$t = 5{,}6$	4.9	12.7	17.2
t-test	-	**	***
Wilcoxon	**	***	***

The average of the last two scaled absolute differences is significantly smaller than the first two for all response variables.

For T7 = HLHL, $\bar{\Delta}_t$ are:

Table 5 - 19: The average absolute percentage changes between periods for each variable for T7.

$\boldsymbol{t}$	$\boldsymbol{n}$	$\boldsymbol{e_u}$	$\boldsymbol{k}$
2	4.4	13.4	16.5
3	4.7	12.8	17.5
4	5.4	13.8	15.7
5	4.7	11.7	14.4
6	6.0	15.2	19.5

Convergence is also not monotonic for all variables in T7.

For T7 = HLHL, $\frac{\bar{\Delta}_2+\bar{\Delta}_3}{2}$ and $\frac{\bar{\Delta}_5+\bar{\Delta}_6}{2}$ are:

Table 5 - 20: The average of the first and last two scaled absolute percentage differences, t-test and Wilcoxon Signed Ranked Test result for T7.

Average	$\boldsymbol{n}$	$\boldsymbol{e_u}$	$\boldsymbol{k}$
$t = 2{,}3$	4.5	13.1	17.0
$t = 5{,}6$	5.3	13.4	17.0
t-test	-	-	-
Wilcoxon	-	-	-

The average of the last two scaled absolute differences is *greater than or equal to* the average for the first two for all response variables.

For T8 = LHHL, $\bar{\Delta}_t$ are:

Table 5 - 21: The average absolute percentage changes between periods for each variable for T8.

$\boldsymbol{t}$	$\boldsymbol{n}$	$\boldsymbol{e_u}$	$\boldsymbol{k}$
2	13.7	24.1	31.4
3	10.3	20.5	21.8
4	9.7	20.5	24.8
5	10.2	16.0	20.5
6	9.6	14.2	14.7

The results show that convergence for each response variable, n, e_u and $k,$ is not monotonic.

For T8 = LHHL, $\frac{\bar{\Delta}_2+\bar{\Delta}_3}{2}$ and $\frac{\bar{\Delta}_5+\bar{\Delta}_6}{2}$ are:

Table 5 - 22: The average of the first and last two scaled absolute percentage differences, t-test and Wilcoxon Signed Ranked Test result for T8.

Average	$\boldsymbol{n}$	$\boldsymbol{e_u}$	$\boldsymbol{k}$
$t = 2,3$	12.0	22.3	26.6
$t = 5,6$	9.9	15.1	17.6
t-test	-	**	***
Wilcoxon	*	**	**

The average of the last two scaled absolute differences is significantly less than the average for the first two for all response variables.

For T9 = HHHL, $\bar{\Delta}_t$ are:

Table 5 - 23: The average absolute percentage changes between periods for each variable for T9.

$\boldsymbol{t}$	$\boldsymbol{n}$	$\boldsymbol{e_u}$	$\boldsymbol{k}$
2	5.6	18.7	24.8
3	6.0	14.2	18.5
4	5.4	11.9	12.2
5	5.5	9.9	8.9
6	4.2	8.6	12.9

Convergence in T9 is not monotonic, except for e_u which is similar to T4.

For T9 = HHHL, $\frac{\bar{\Delta}_2+\bar{\Delta}_3}{2}$ and $\frac{\bar{\Delta}_5+\bar{\Delta}_6}{2}$ are:

Table 5 - 24: The average of the first and last two scaled absolute percentage differences, t-test and Wilcoxon Signed Ranked Test result for T9.

Average	$\boldsymbol{n}$	$\boldsymbol{e_u}$	$\boldsymbol{k}$
$t = 2,3$	5.8	16.4	21.6
$t = 5,6$	4.9	9.3	10.9
t-test	-	***	***
Wilcoxon	-	***	***

The average of the last two scaled absolute differences is significantly less than the average for the first two for all response variables, except for n.

In general, this study found that there was an increase in stability over the 6 periods, though it was non-monotonic (always increase or decrease). Also, this study found that the last 3 periods generally indicated more stable decisions than the first 3 periods. The researcher therefore focus the remainder of the analysis on the last 3 periods in the main analysis.[33]

The large variation across treatments in average absolute differences for the final 3 periods is worthy of remark. When the treatment was Hxxx, the final average absolute difference for n was between 4.8% and 5.3%. Hxxx corresponds to high wakalah, irrespective of the other compensation values. While when the treatment was Lxxx, the final average absolute difference for n was between 7.4% and 11.5%. For e_u and k, the largest final average absolute differences were in the LLLL treatment, with 17.7% and 24.2% respectively.

This might reflect essentially arbitrary decision making when all incentives are weak. The smallest final average absolute differences for e_u and k were in the HHHL treatment, with

[33] Analysis of all 6 periods are presented in an appendix.

9.3% and 10.9% respectively, when wakalah, mudarabah and ji'alah incentives were much more salient.

In summary, when 3 incentives are weak (LLLL treatment), the e_u and k have the largest average differences and n was the second largest. Meanwhile, when incentives are high (HHHL treatment), the e_u and k have the smallest average differences and n was the second smallest. This might show that subjects make a random decision when all incentives are weak and stable decision making when the incentives are high – they not change their decisions from 1 to 6 periods. Possibly, subjects take more care over their decisions when there is more money at stake.

5.4 Order Effects

The usual approach with order effects only covers within-subjects experiment with two treatments. Call the treatments 1 and 2. The idea is that the response variable for one treatment might be affected by the treatment that has gone before. Treatment 1 followed by treatment 2 would show a different effect on the response variable compared to when the order was treatment 2 followed by treatment 1. To examine whether there is an order effect, variation is needed in the order. Hence half the subjects do treatment 1 followed by treatment 2 and the other half have the order of treatments reversed. The average values of the response variables for a given treatment are then compared for significant differences. If there are no significant differences, then there is no order effect, and the data can be pooled and analysed together for all subjects.

The test for order effects comes from a cross-sectional regression of average subject response for a treatment (for example n for treatment LHLL) on up to 8 binary dummy variables, each indicating the treatment's position in the sequence of 9 treatments. It takes only the value 0 or 1 to indicate the absence or presence or act like 'switches' that turn parameters on and off in the regression. The researcher believes that the response variable for one treatment might be affected by the treatment that has gone before. Thus, The researcher uses dummy variables to test the order effects. The omission of a dummy variable is intentional to avoid perfect multicollinearity when an intercept term is included in the regression. The researcher must also omit position dummies with no sample observations, as reported in Section 4.4.2.2. Personal characteristics control variables were included in the regression but are not reported.

The intercept estimates the cross-sectional average for the omitted position. The estimated coefficients for the position regressors estimate differences in average, relative to the omitted position. The F-statistic is a joint test that altering the position in the sequence for the given treatment does not significantly affect average response. A low probability value suggests there are *some* significant differences in average response due to treatment position.

If there is a significant position effect by the F-statistic, the t-statistics point to *which* position numbers are responsible. A t-test, with its corresponding p-value, examines the hypothesis that the population value of a *single* regression coefficient is zero. A F-test, with its corresponding p-value, examines the hypothesis that the population values of the *full set* of regression coefficients are zero everywhere. The hypothesis is that all the averages are the same. This translates to a test of zero population coefficients. The Kruskal-Wallis tests hypothesise equal medians. These are also presented below. The test corrects for ties.[34]

For T1 = LLLL: the p-values are

Table 5 - 25: Regression (t-test and F-test) and Kruskal-Wallis test results for T1[35].

	Positions									
	1	2	3	4	5	6	7	8	9	F	K-W
n	-	-	0.906	0.141	0.357	0.314	0.424	**0.015**	**0.090**	0.192	**0.062**
e_u	-	-	0.873	0.104	0.124	0.040	0.784	0.116	0.003	0.186	0.175
k	-	-	0.767	**0.055**	0.107	**0.034**	0.629	0.209	**0.005**	**0.083**	0.268

The test strategy is to examine first the null hypothesis that there are no position effects (by the F-statistic and KW statistic). If the null hypothesis is rejected, the researcher

[34] The researcher has not conducted diagnostic tests on the regressions. Although the estimates are still unbiased, The researcher cannot therefore claim they are *best*, since heteroscedasticity has not been investigated. F and t-tests of significance may be biased. The Kruskal-Wallis (KW) statistics have 95.5% efficiency for correctly rejecting the null hypothesis when the conditions for the F-test are met. This test also assumes the underlying distributions are homoscedastic. It also does not control for personal characteristics. It does, however, dispense with the assumption of Normality, which the F-test depends upon.
[35] The excluded observation is P2.

examines the hypothesis that each individual position has no effect (by the t-tests). There is a bold value in cells in which a p-value for the regression or KW statistic is 0.1 or less.

In table above, F-tests show no position effects for n and e_u, but there is a $p = 0.083$ effect for k, with t-values indicating significant P4, P6, P9. KW statistics indicate a position effect for n, and the t-tests show P8 and P9 are significant. Thus, the response is to add interaction dummies to the main analysis: P8, P9 for n; P4, P6, P9 for k.

For T2 = HLLL: the p-values are

Table 5 - 26: Regression (t-test and F-test) and Kruskal-Wallis test results for T2.[36]

	Positions										
	1	2	3	4	5	6	7	8	9	F	K-W
n	-	0.262	0.953	0.259	0.296	0.408	-	0.259	0.247	**0.082**	0.545
e_u	-	0.354	0.799	0.304	0.328	0.342	-	0.497	0.299	0.101	0.415
k	-	0.354	0.283	0.268	**0.083**	**0.095**	-	0.721	0.337	**0.011**	0.327

F-test shows a position effect for k, with t-values indicating significant P5, P6. The F-test for n is significant, but the t-tests are not. The KW statistics show no position effects. The response is to add interaction dummies to the main analysis: P5, P6 for k.

For T3 = LHLL: the p-values are

Table 5 - 27: Regression (t-test and F-test) and Kruskal-Wallis test results for T3.[37]

	Positions										
	1	2	3	4	5	6	7	8	9	F	K-W
n	-	0.284	0.592	0.325	0.767	0.438	0.564	0.064	0.840	0.431	0.560
e_u	-	0.882	0.999	0.287	0.778	0.702	0.417	0.210	0.327	**0.042**	0.651
k	-	0.474	0.196	0.180	0.387	0.502	0.972	0.605	0.886	0.173	0.264

[36] The excluded observation is P1.
[37] The excluded observation is P1.

The t-tests and KW statistics show no position effects. The F-test for e_u is significant, but the t-tests are not.

For T4 = LLHL: the p-values are

Table 5 - 28: Regression (t-test and F-test) and Kruskal-Wallis test results for T4.[38]

	Positions										
	1	2	3	4	5	6	7	8	9	F	K-W
n	-	0.246	0.358	0.556	0.733	0.006	-	0.598	0.848	0.142	0.381
e_u	-	0.305	0.162	0.086	0.411	0.760	-	0.073	0.352	0.366	0.422
k	-	0.328	0.946	0.732	0.428	0.414	-	0.872	0.644	0.432	0.574

F-tests and KW statistics show no position effects.

For T5 = LLLH: the p-values are

Table 5 - 29: Regression (t-test and F-test) and Kruskal-Wallis test results for T5.[39]

	Positions										
	1	2	3	4	5	6	7	8	9	F	K-W
n	-	0.193	0.869	0.717	-	-	0.428	0.411	0.769	**0.081**	0.216
e_u	-	0.570	0.495	0.241	-	-	0.159	0.591	0.756	**0.021**	0.190
k	-	0.942	0.236	0.084	-	-	0.020	0.565	0.739	0.138	0.197

The t-tests and KW statistics show no position effects. The F-tests for n and e_u are significant, but the t-tests are not.

[38] The excluded observation is P1.
[39] The excluded observation is P1.

For T6 = HHLL: the p-values are

Table 5 - 30: Regression (t-test and F-test) and Kruskal-Wallis test results for T6.[40]

	Positions									
	1	2	3	4	5	6	7	8	9	F	K-W
n	-	0.243	0.782	0.859	0.666	0.159	0.659	0.799	0.987	0.184	0.691
e_u	-	0.723	0.974	0.365	0.320	0.440	0.175	0.735	0.942	**0.059**	0.708
k	-	0.400	0.914	0.500	0.531	0.235	0.534	0.514	0.816	**0.042**	0.678

The t-tests and KW statistics show no position effects. The F-tests for e_u and k are significant, but the t-tests are not.

For T7 = HLHL: the p-values are

Table 5 - 31: Regression (t-test and F-test) and Kruskal-Wallis test results for T7.[41]

	Positions										
	1	2	3	4	5	6	7	8	9	F	K-W
n	-	0.613	0.712	0.941	0.067	0.579	-	0.423	0.757	0.750	0.888
e_u	-	0.025	0.228	0.447	0.069	0.856	-	0.017	0.055	0.518	0.542
k	-	0.050	0.072	0.497	0.392	0.996	-	0.010	0.099	0.345	0.283

The F-tests and KW statistics show no position effects.

[40] The excluded observation is P1.
[41] The excluded observation is P1.

For T8 = LHHL: the p-values are

Table 5 - 32: Regression (t-test and F-test) and Kruskal-Wallis test results for T8.[42]

	Positions									
	1	2	3	4	5	6	7	8	9	F	K-W
$\boldsymbol{n}$	-	0.379	**0.077**	0.143	**0.027**	**0.022**	-	**0.002**	**0.030**	**0.009**	**0.003**
$\boldsymbol{e_u}$	-	0.421	0.884	0.589	0.369	0.230	-	0.047	0.057	0.253	0.362
$\boldsymbol{k}$	-	0.350	0.416	0.997	0.717	0.746	-	0.108	0.134	0.375	0.572

F-tests show a $p = 0.009$ position effect for n, with t-values indicating significant P3, P5, P6, P8, P9. Also, KW statistics indicate a position effect for n. Therefore, the response is to add interaction dummies to the main analysis: P3, P5, P6, P8, P9 for n.

For T9 = HHHL: the p-values are

Table 5 - 33: Regression (t-test and F-test) and Kruskal-Wallis test results for T9.[43]

	Positions										
	1	2	3	4	5	6	7	8	9	F	K-W
$\boldsymbol{n}$	-	0.105	0.126	0.446	0.232	0.794	0.476	0.803	0.949	**0.043**	**0.050**
$\boldsymbol{e_u}$	-	0.225	0.576	0.308	0.660	0.060	0.024	0.108	0.117	0.343	0.343
$\boldsymbol{k}$	-	0.052	0.126	0.208	0.517	0.221	0.028	0.246	0.131	0.351	0.638

The t-tests and KW statistics show no position effects in T9. The F-test and KW statistic for n are significant, but the t-tests are not. Since the researcher cannot identify any individual significant coefficient, the researcher make no response to the main analysis.

To sum up, the researcher adds interaction dummies that were observed significance of position variables to the main analysis. Thus, the position is interacting with treatment. Since they have a significant effect, the researcher captured that in control variable.

[42] The excluded observation is P1.
[43] The excluded observation is P1.

5.5 Subject Decisions

For each response variable (n, e_u, k), treatment (T1, …, T9), & subject $(i = 1, \ldots, 79)$, this study has 6 consecutive observations, denoted $\delta_1, \ldots, \delta_6$. To take into account convergence, the researcher uses only the final three observations.

For each decision type and treatment, the researcher forms the mean response:

$$\overline{\delta} = \frac{1}{3}\sum_{t=4}^{6} \delta_t$$

which becomes the dependent variable (n, e_u, k) in a regression equation.[44] Therefore, the researcher is estimating the effects of the (α, m, s, F) and also the interactions. So, they correspond to all the treatment. And these were represented by the dummy variable.

In the treatments, the researcher lets:

- $\alpha = 1$ if the observation was made under treatments Hxxx, zero otherwise.
- $m = 1$ if the observation was made under treatments xHxx, zero otherwise.
- $s = 1$ if the observation was made under treatments xxHx, zero otherwise.
- $F = 1$ if the observation was made under treatments xxxH, zero otherwise.

Thus, for example, $\alpha = s = 1, m = F = 0$ represents treatment HLHL.

The multiple regression model for each type of subject response, $n,\ e_u,\ k$, is then:

$$\overline{\delta} = \beta_0 + \beta_1\alpha + \beta_2 m + \beta_3 s + \beta_4 F + \beta_5(\alpha \times m) + \beta_6(\alpha \times s) + \beta_7(m \times s) + \beta_8(\alpha \times m \times s)$$

allowing both main and interaction effects to be estimated. The $\beta_q, q = 0, \ldots, 8$ are coefficients to be estimated in the regressions.

[44] The results for the mean response over all 6 consecutive observations in each treatment are set out in an appendix. Unless noted the qualitative conclusions in the main text are the same for the analyses of means of all 6 consecutive observations.

Control variables for the position (order) effect are also added to the regression in accordance with the results in Section 5.4. Let $\mathrm{P}j = 1$ if a given treatment was presented in position j of the sequence of 9 treatments, and zero otherwise ($j = 1, \dots, 9$).[45]

Interaction variables are added to the regression for n, to control for the effect of position as follows:

$$(1-\alpha) \times (1-m) \times (1-s) \times (1-F) \times P8$$

$$+(1-\alpha) \times (1-m) \times (1-s) \times (1-F) \times P9$$

$$+(1-\alpha) \times m \times s \times (1-F) \times P3$$

$$+ (1-\alpha) \times m \times s \times (1-F) \times P5$$

$$+ (1-\alpha) \times m \times s \times (1-F) \times P6$$

$$+ (1-\alpha) \times m \times s \times (1-F) \times P8$$

$$+ (1-\alpha) \times m \times s \times (1-F) \times P9$$

The significant treatments with significant individual position effects in t-test will be added in the main regression. The interaction variables can take value of only 0 and 1. Example in the first line, 1 minus α is equal to 0 α. So the first line is $\alpha = m = s = F = 0$ represents LLLL. And then we have P8 which means that the interaction says that when LLLL is in position 8, then that interaction variable takes the value of one. Thus the P8 and P9 controls are 'switched on' only if the treatment is LLLL ($\alpha = m = s = F = 0 \Rightarrow (1-\alpha) = (1-m) = (1-s) = (1-F) = 1$), and the P3, P5, P6, P8 and P9 controls are 'switched on' only if the treatment is LHHL ($\alpha = F = 0, m = s = 1 \Rightarrow (1-\alpha) = (1-F) = m = s = 1$).

Interaction variables are added to the regression for k, to control for the effect of position as follows:

$$(1-\alpha) \times (1-m) \times (1-s) \times (1-F) \times P4$$

$$+(1-\alpha) \times (1-m) \times (1-s) \times (1-F) \times P6$$

$$+(1-\alpha) \times (1-m) \times (1-s) \times (1-F) \times P9$$

$$+ \alpha \times (1-m) \times (1-s) \times (1-F) \times P5$$

45 The control variables differed according to whether the regression was for a 6-period or a 3-period average.

$$+\alpha \times (1-m) \times (1-s) \times (1-F) \times P6$$

Thus P4, P6 and P9 are 'switched on' if the treatment is LLLL, and P5 and P6 are 'switched on' if the treatment is HLLL.

Control variables for personal characteristics were also added to the regression[46]. The estimated regression for n as the dependent variable follows:

Table 5 - 34: The estimated regression for n as the dependent variable.

Dependent Variable = $\overline{n}$		
Regressor	Estimated Coefficients	*p*-values (2-tailed)
constant	59.148	0.00
α	10.488	0.00
m	0.589	0.84
s	7.403	0.01
F	1.429	0.63
$\alpha \times m$	0.517	0.90
$\alpha \times s$	-7.572	0.06
$m \times s$	-10.446	0.04
$\alpha \times m \times s$	10.412	0.11

For each regression, the sample size is 9 treatments for 79 subjects, which totals 711. The interaction variable $m \times s$ had the highest variance inflation factor (VIF), but its coefficient is nevertheless significant.

Statistical significances of individual coefficients are assessed through p-values based on the t-statistics. Compound hypotheses on sets of coefficients are assessed by F-tests, using average differences in the sums of squared residuals from restricted, imposing the null hypothesis, and unrestricted regressions. When one-tailed hypotheses

[46] To converse space, the coefficient estimates for the position and personal characteristics control variables for $\overline{n}, \overline{e}_u, \overline{k}$ are reported in an Appendix 11.

are appropriate, the p-value in the preceding table is divided by 2 if the estimated coefficient has the correct sign. The p-values for F-tests are always 2-tailed.

Main effects for α, s are significantly positive, $\hat{\alpha} > \hat{s}$, but there are also significantly negative interaction effects, indicating that the positive impact on n of these forms of compensation is not universal. The positive effect on n of m, F is statistically insignificant.

Hypotheses 1-12, from Chapter 3, derived from Khan (2015a, 2015b), have the following specific forms, given the choice of experimental parameters.

<u>Hypothesis 1</u>: n is increasing in α.

$$\Rightarrow \beta_1, (\beta_1 + \beta_5), (\beta_1 + \beta_6), (\beta_1 + \beta_5 + \beta_6 + \beta_8) > 0$$

Since the prediction of Hypothesis 1 is global, it is valid for $m = 1, s = F = 0; m = F = 0, s = 1; m = s = 1, F = 0$.

The specification of Hypothesis 1 is for any inclusion of wakalah (α) variable where we have β_1 for wakalah, $(\beta_1 + \beta_5)$ for wakalah-mudarabah, $(\beta_1 + \beta_6)$ for wakalah-ji'alah and $(\beta_1 + \beta_5 + \beta_6 + \beta_8)$ for wakalah-mudarabah-ji'alah where the hypothesis is n, number of policyholders is increasing in wakalah. In other words, positive β_1 is saying that wakalah has a positive effect (and low mudarabah and ji'alah). A positive $(\beta_1 + \beta_5)$ is saying that wakalah has a positive effect even when mudarabah is high (and low ji'alah). A positive $(\beta_1 + \beta_6)$ is saying that wakalah has a positive effect even when ji'alah is high (and low mudarabah). And last one, a positive $(\beta_1 + \beta_5 + \beta_6 + \beta_8)$ means wakalah has a positive effect even when both mudarabah and ji'alah are high at the same time. So, it must document all the possibility when wakalah goes up in term of compensation variables.

Table 5 - 35: Tests for Hypothesis 1.

$\hat{\beta}_1$	p	$\hat{\beta}_1 + \hat{\beta}_5$	p	$\hat{\beta}_1 + \hat{\beta}_6$	p	$\hat{\beta}_1 + \hat{\beta}_5 + \hat{\beta}_6 + \hat{\beta}_8$	p
10.488	0.00	11.005	0.00	2.916	0.90	13.845	0.00

The results of the tests analysis are shown in table above. As can be seen from the table, when ji'alah is low (i.e. β_1 and $\beta_1 + \beta_5$), regardless of mudarabah, increasing wakalah leads to increased number of policyholders. The estimated coefficient when s (ji'alah) is high and m (mudarabah) is low, 2.916, is positive, but has no statistical significance. The significantly positive effect is restored if both s (ji'alah) and m (mudarabah) are high (i.e. when $\beta_1 + \beta_5 + \beta_6 + \beta_8$). These results broadly confirm Khan's hypothesis that number of policyholders is increasing in wakalah, though the interaction effect of m (mudarabah) is unpredicted.

This finding is consistent with the agency theory as being discussed in Chapter 2. Wakalah gives the takaful operator a stake in building up fund revenue, but no stake in cost control or investment profit. Hence, if wakalah compensation alone is in place, the takaful operator has an incentive to increase the customer base, regardless of risk class, increasing the cost of claims. Wakalah alone also does not impose any risk on the operator, because the sales commission does not depend on claims and investment performance. This finding is consistent with Gonulal (2012, p. 103) where he said that wakalah is to the benefit of the agent to increase turnover.

<u>Hypothesis 2</u>: The positive effect of α on n is decreasing in s.

$$\Rightarrow \beta_6, (\beta_6 + \beta_8) < 0$$

Compare average number of policyholders (n) when LLLL (β_0) changes to HLLL ($\beta_0 + \beta_1$) with average number of policyholders (n) when LLHL ($\beta_0 + \beta_3$) changes to HLHL ($\beta_0 + \beta_1 + \beta_3 + \beta_6$). This is equivalent to comparing β_1 with $\beta_1 + \beta_6$, or equivalently examining the sign of β_6.

Also compare average number of policyholders (n) when LHLL ($\beta_0 + \beta_2$) changes to HHLL ($\beta_0 + \beta_1 + \beta_2 + \beta_5$) with average number of policyholders (n) when LHHL ($\beta_0 + \beta_2 + \beta_3 + \beta_7$) changes to HHHL ($\beta_0 + \beta_1 + \beta_2 + \beta_3 + \beta_5 + \beta_6 + \beta_7 + \beta_8$). This is equivalent to comparing $\beta_1 + \beta_5$ with $\beta_1 + \beta_5 + \beta_6 + \beta_8$, or equivalently examining the sign of $\beta_6 + \beta_8$.

Here, the researcher wants to test whether the positive effect of wakalah (α) on number of policyholders (n) is decreasing in ji'alah (s), and so the positive wakalah on number of policyholders is supposed to be positive, but it is less positive when ji'alah is high. A negative β_6 is saying that high wakalah has a negative effect when ji'alah is high. A negative $(\beta_6 + \beta_8)$ is saying that high wakalah has negative effect when both mudarabah and ji'alah are high at the same time.

Table 5 - 36: Tests for Hypothesis 2.

$\hat{\beta}_6$	p	$\hat{\beta}_6 + \hat{\beta}_8$	p
-7.572	0.06	2.84	0.58

The table above illustrates the results of the tests for Hypothesis 2. From the table, it can be seen that when mudarabah (m) is low that is β_6, the positive effect of wakalah (α) on number of policholders (n) is significantly weakened by increasing ji'alah (s), but this weakening is not significant when mudarabah (m) is high that is $\beta_6 + \beta_8$. The role of mudarabah is not predicted by Khan's analysis.

This study produced results which corroborate the findings of the previous work in Khan (2015a). These results further support the Hypothesis 2 where the positive effect of wakalah on number of policyholders is decreasing in ji'alah. A possible explanation for this might be that ji'alah, which enables the takaful operator to collect part of the premium from the surplus and also because part of the premium is paid out in claims, crowds out the effect of wakalah incentives. Therefore, although the wakalah incentive is always positive, it declines as ji'alah increases.

<u>Hypothesis 3</u>: n is increasing in s if and only if $\gamma_2 > 0$.

Given the experimental parameter values,

$$\gamma_2 = 10(1 - 10\alpha) < 0$$

because the minimum value of $\alpha = 0.15$.

γ_2 is the insurance premium, net of wakalah, with expected expenses at their maximum. If $\gamma_2 < 0$, the fund makes a loss on each policy unless the operator supplies effort to reduce costs. γ_2 will be -5 when the minimum value of wakalah is 0.15. Even when wakalah is high, 0.3, it also will be negative. It is because the wakalah (α) has negative coefficient in the equation. So, if you raise it, you'll lowering the γ_2.

Why was this feature incorporated? γ_2 can be negative if wakalah is sufficiently high. If γ_2 is negative, the fund makes a loss on each policy unless the operator gives effort to reduce cost. This was a design feature, to ensure there was a non-trivial moral hazard problem in the model. Hence, number of policyholders (n) should be *decreasing* in ji'alah (s), globally. Thus, it should have

$$\beta_3, (\beta_3 + \beta_6), (\beta_3 + \beta_7), (\beta_3 + \beta_6 + \beta_7 + \beta_8) < 0$$

Table 5 - 37: Tests for Hypothesis 3.

$\hat{\beta}_3$	p	$\hat{\beta}_3 + \hat{\beta}_6$	p	$\hat{\beta}_3 + \hat{\beta}_7$	p	$\hat{\beta}_3 + \hat{\beta}_6 + \hat{\beta}_7 + \hat{\beta}_8$	p
7.403	0.01	-0.169	0.95	-3.043	0.48	-0.203	0.94

Table above presents the results of the tests for Hypothesis 3. It is apparent from this table that when wakalah and mudarabah $(\alpha \; and \; m)$ are both low, increasing ji'alah (s) leads to a significant increase in number of policyholders (n), in contrast to Khan's prediction. This 'wrong' sign vanishes when wakalah or mudarabah $(\alpha$ or $m)$, or both, are high. The coefficients are then the correct sign, but not significantly different from zero. Khan's prediction is not clearly demonstrated by the data. Therefore, it could say that number of policyholders goes up when ji'alah goes up, but this effect happens only when the wakalah incentive is sufficiently small.

Hypothesis 4: α by itself is more powerful as an incentive to increase n than is s by itself.

This study does not have zero values for wakalah and ji'alah (α, s) in the experiment, but as an approximation, the researcher can compare incentives when moving from LLLL to HLLL (increasing wakalah) and when moving from LLLL to LLHL (increasing ji'alah). In Khan's model, the difference between the incentives is positive if and only if

$$(1 - s_{minimum})p - (1 - \alpha_{minimum})p + 90 > 0 \Rightarrow (\alpha_{minimum} - s_{minimum})p + 90 > 0.$$

With $\alpha_{minimum} = s_{minimum} = 0$, the condition is satisfied. With $\alpha_{minimum} = 0.15, s_{minimum} = 0.1$, the condition is also satisfied.

The hypothesis 4 indicates that wakalah is a more powerful incentive than ji'alah for increasing number of policyholders (n). It is because wakalah relates to the number of policyholders. As a result, it is directly affected the number of policyholders. However, the ji'alah is the surplus-sharing where it is implicitly affect the number of policyholders. Thus, the equation in hypothesis 4 asks if the influence of wakalah is greater than the effect of ji'alah. The reason the left side is positive is that the wakalah effect is greater than the ji'alah effect.

The results of the tests for hypothesis 4 are summarised in table below. The empirical effects are measured by wakalah and ji'alah (β_1, β_3) respectively. The research hypothesis is $\beta_1 > \beta_3$. $\hat{\beta}_1 = 10.488 > \hat{\beta}_3 = 7.403$, but the difference is not statistically significant (see table below). This result does not support Khan's hypothesis. It has been suggested that wakalah is a more powerful incentive than ji'alah for increasing number of policyholders. This does not appear to be the case. This inconsistency may be due to ji'alah also gives a general incentive to perform the three tasks well, since it gives the takaful operator a share of residual funds, which are determined by revenue, including investment income and costs.

Table 5 - 38: Tests for Hypothesis 4.

$\hat{\beta}_1 - \hat{\beta}_3$	p
3.085	0.26

Hypothesis 5: n is unaffected by m.

To confirm this, this study offers 2-tailed tests of the null hypotheses, $\beta_2 = 0, (\beta_2 + \beta_5) = 0, (\beta_2 + \beta_7) = 0,\ (\beta_2 + \beta_5 + \beta_7 + \beta_8) = 0$.

Table 5 - 39: Tests for Hypothesis 5.

$\hat{\beta}_2$	p	$\hat{\beta}_2 + \hat{\beta}_5$	p	$\hat{\beta}_2 + \hat{\beta}_7$	p	$\hat{\beta}_2 + \hat{\beta}_5 + \hat{\beta}_7 + \hat{\beta}_8$	p
0.589	0.84	1.106	0.69	-9.857	0.02	1.072	0.70

In hypothesis 5, it suggests that number of policyholders is unaffected by mudarabah. However, the findings of the current study do not support the theoretical model by Khan (2015a). The results obtained from the tests for hypothesis 5 can be seen in table above. As shown in table, increasing mudarabah (m) significantly reduces number of policyholders (n), but only if both ji'alah (s) is high and wakalah (α) is low ($\beta_2 + \beta_7 = -9.857, p = 0.02$). This conflicts with the prediction of Khan's model.

Now, let us see the estimated regression with e_u as dependent variable follows.

Table 5 - 40: The estimated regression with e_u as the dependent variable.

Dependent Variable = $\overline{e}_u$		
Regressor	Estimated Coefficients	*p*-values (2-tailed)
constant	30.509	0.00
α	1.903	0.38
m	1.806	0.40
s	11.392	0.00
F	-0.089	0.97
$\alpha \times m$	0.633	0.84
$\alpha \times s$	-5.502	0.07
$m \times s$	-2.911	0.34
$\alpha \times m \times s$	1.051	0.81

The only statistically significant main effect on underwriting effort (e_u) is due to ji'alah (s), and the effect is positive $(s = 11.392, p = 0.00)$. The effects on underwriting effort (e_u) of wakalah, mudarah and fixed salary (α, m, F) are all statistically insignificant.[47] There is also a significant negative interaction effect, $\alpha \times s$, weakening the e_u incentive. Based on results, this study develops few hypotheses to be tested as below.

[47] The interaction variable $\alpha \times m \times s$ had the highest variance inflation factor at 7.11<10. This multicollinearity should not be regarded as a problem in the regression on operator effort as a rule of thumb is 10.

Hypothesis 6: e_u is increasing in s if and only if $\gamma_1 > 0$

Given the experimental parameters,

$$\gamma_1 = 100\alpha > 0$$

The researcher should therefore find:

$$\beta_3, (\beta_3 + \beta_6), (\beta_3 + \beta_7), (\beta_3 + \beta_6 + \beta_7 + \beta_8) > 0$$

Table 5 - 41: Tests for Hypothesis 6.

$\hat{\beta}_3$	p	$\hat{\beta}_3 + \hat{\beta}_6$	p	$\hat{\beta}_3 + \hat{\beta}_7$	p	$\hat{\beta}_3 + \hat{\beta}_6 + \hat{\beta}_7 + \hat{\beta}_8$	p
11.392	0.00	5.890	0.01	8.481	0.00	4.030	0.06

The table above illustrates the results of the tests for hypothesis 6. What stands out in the table is effort is increasing in ji'alah (s), regardless of wakalah and mudarabah (α and m), confirming Khan's prediction. All interaction effects reinforce the positive main effect. These results may explain that the underwriting effort is solely motivated by ji'alah. As they would also profit from any gains, Gonulal (2012) claims that sharing in surplus (in this case is ji'alah) could incentivize takaful operators to underwrite prudently. Wakalah and mudarabah incentives do not have any direct effect on the underwriting effort. The indirect effect may feed through its impact on ji'alah.

Hypothesis 7a: e_u is decreasing in α if and only if $s > 0$

$$\Rightarrow \beta_1, (\beta_1 + \beta_5), (\beta_1 + \beta_6), (\beta_1 + \beta_5 + \beta_6 + \beta_8) < 0$$

Alternatively, Khan's (2015b) gift exchange hypothesis is:

Hypothesis 7b: e_u is increasing in α

$$\Rightarrow \beta_1, (\beta_1 + \beta_5), (\beta_1 + \beta_6), (\beta_1 + \beta_5 + \beta_6 + \beta_8) > 0$$

Table 5 - 42: Tests for Hypothesis 7.

$\hat{\beta}_1$	p	$\hat{\beta}_1 + \hat{\beta}_5$	p	$\hat{\beta}_1 + \hat{\beta}_6$	p	$\hat{\beta}_1 + \hat{\beta}_5 + \hat{\beta}_6 + \hat{\beta}_8$	p
1.903	0.38	2.536	0.24	-3.599	0.09	-1.915	0.37

Table above provides the results obtained from the tests for hypothesis 7. It can be seen from the data in the table that the effect on underwriting effort (e_u) of wakalah (α) is negative and statistically significant, but only when ji'alah (s) is high and mudarabah (m) is low $(\beta_1 + \beta_6 = -3.599, p = 0.09)$. Thus, neither the agency nor the gift exchange predictions are clearly supported. This result may reflect that wakalah incentive does not have any direct effect on the underwriting effort. The hazard of wakalah, according to Gonulal (2012), arises when its increase in turnover is attained through poor underwriting effort, which is unsupported in this instance.

Hypothesis 8: e_u is insensitive to m

The researcher should therefore observe

$$\beta_2, (\beta_2 + \beta_5), (\beta_2 + \beta_7), (\beta_2 + \beta_5 + \beta_7 + \beta_8) = 0$$

Table 5 - 43: Tests for Hypothesis 8.

$\hat{\beta}_2$	p	$\hat{\beta}_2 + \hat{\beta}_5$	p	$\hat{\beta}_2 + \hat{\beta}_7$	p	$\hat{\beta}_2 + \hat{\beta}_5 + \hat{\beta}_7 + \hat{\beta}_8$	p
1.806	0.40	2.439	0.26	-1.105	0.61	0.579	0.79

Table above shows the results of the tests for hypothesis 8. In hypothesis 8, it claims that underwriting effort is insensitive to mudarabah. The study supports evidence that the effect on underwriting effort (e_u) of mudarabah (m) is everywhere statistically insignificant, in accordance with hypothesis 8. Therefore, this result may reflect that mudarabah incentive does not have any direct effect on the underwriting effort.

Now, let us see the estimated regression with k as dependent variable as follows.

Table 5 - 44: The estimated regression with k as the dependent variable.

Dependent Variable = $\overline{k}$		
Regressor	Estimated Coefficients	*p*-values (2-tailed)
constant	0.427	0.00
α	-0.011	0.76
m	0.022	0.52
s	0.084	0.01
f	-0.006	0.86
$\alpha \times m$	-0.024	0.59
$\alpha \times s$	-0.070	0.11
$m \times s$	-0.006	0.88
$\alpha \times m \times s$	0.036	0.52

The only statistically significant main effect on proportion of average technical reserves invested (k) is due to ji'alah (s), and the effect is positive $(s = 0.084, p = 0.01)$. The effects on proportion of average technical reserves invested (k) of wakalah, mudarabah and fixed salary (α, m, F) are all statistically insignificant.[48]

Hypothesis 9: k is increasing in m if and only if $\gamma_1\gamma_2 + \gamma_2^2 s + u^2 c_p s > 0$

Since c_p has no analogous parameter in the experiment, this study offers a 2-tail test.[49] The researcher should therefore observe

$$\beta_2, (\beta_2 + \beta_5), (\beta_2 + \beta_7), (\beta_2 + \beta_5 + \beta_7 + \beta_8) \neq 0$$

[48] The interaction variables $\alpha \times m$ and $\alpha \times s$ had the highest variance inflation factors at 9.7<10.
[49] The c_p in Khan's operator cost equation is the coefficient of n^2. In our specification, there is no squared term and therefore no analogous parameter.

Table 5 - 45: Tests for Hypothesis 9.

$\hat{\beta}_2$	p	$\hat{\beta}_2 + \hat{\beta}_5$	p	$\hat{\beta}_2 + \hat{\beta}_7$	p	$\hat{\beta}_2 + \hat{\beta}_5 + \hat{\beta}_7 + \hat{\beta}_8$	p
0.022	0.52	-0.002	0.94	0.016	0.54	0.028	0.26

The results of the tests for hypothesis 9 are shown in table above. What stands out in the table is the effect on proportion of average technical reserves invested (k) of mudarabah (m) is everywhere statistically insignificant.

Hypothesis 10: k is increasing in α if and only if $\gamma_2 - \gamma_1 - 2\gamma_2 s < 0$

$\gamma_2 - \gamma_1 - 2\gamma_2 s = (1 - 2s)\gamma_2 - \gamma_1$. In the experiment, $1 - 2s \geq 0$, $\gamma_2 = 10 - 100\alpha < 0$ and $\gamma_1 = 100\alpha > 0$. Therefore, the qualifying condition is globally satisfied and k should be increasing in α.

The researcher should observe

$$\beta_1, (\beta_1 + \beta_5), (\beta_1 + \beta_5), (\beta_1 + \beta_5 + \beta_6 + \beta_8) \ > 0$$

Table 5 - 46: Tests for Hypothesis 10.

$\hat{\beta}_1$	p	$\hat{\beta}_1 + \hat{\beta}_5$	p	$\hat{\beta}_1 + \hat{\beta}_6$	p	$\hat{\beta}_1 + \hat{\beta}_5 + \hat{\beta}_6 + \hat{\beta}_8$	p
-0.011	0.76	-0.035	0.16	-0.081	0.00	-0.069	0.01

The results obtained from the tests for hypothesis 10 are presented in table above. These findings are somewhat surprising given that the effect on proportion of average technical reserves invested (k) of wakalah (α) has everywhere the wrong sign. This study produced results which corroborate the findings of increasing wakalah (α) reduces proportion of average technical reserves invested (k), contradicting hypothesis 10.

Hypothesis 11: k is increasing in s if and only if $i(1-m)(\gamma_1\gamma_2+\gamma_2^2\ s+u^2c_p s)>\gamma_3(\gamma_2^2\ +u^2c_p)$

Since c_p is ill-defined in the experiment, this study offer a 2-tailed test only.

Table 5 - 47: Tests for Hypothesis 11.

$\hat{\beta}_3$	p	$\hat{\beta}_3+\hat{\beta}_6$	p	$\hat{\beta}_3+\hat{\beta}_7$	p	$\hat{\beta}_3+\hat{\beta}_6+\hat{\beta}_7+\hat{\beta}_8$	p
0.084	0.01	0.014	0.61	0.078	0.00	0.044	0.07

Table above provides the results obtained from the tests for hypothesis 11. Looking at the table, it is apparent that proportion of average technical reserves invested (k) is significantly positively affected by ji'alah (s), except when wakalah (α) is high and mudarabah (m) is simultaneously low $(\beta_3+\beta_6=0.014, p=0.61)$. Thus, Khan's hypothesis 11 is broadly supported.

Hypothesis 12: e_u is increasing in F, which suggests $\beta_4>0$

Table 5 - 48: Tests for Hypothesis 12.

$\hat{\beta}_4$	p
-0.089	0.97

The table above shows the result for tests for hypothesis 12. As can be seen from the table, the 'gift exchange' effect has the wrong sign and is insignificant. There were also no significant effects of F on the other 2 decision variables, n,k.

In summary, as predicted in Khan (2015a), both wakalah and ji'alah (α,s) provide the operator with incentives to increase number of policyholders (n). Wakalah and ji'alah (α,s) appear to be substitutes, though the per-unit coefficients are not significantly different. Note, however, that the coefficient on wakalah (α) measures the effect of a doubling of the wakalah payment (from 0.15 to 0.3), whereas the coefficient on ji'alah (s) represents the effect of a five-fold increase in the ji'alah payment (from 0.1 to 0.5).

Coefficients that are approximately the same therefore suggest that doubling wakalah is about as effective as multiplying ji'alah by five.

There is a role for mudarabah (m) in moderating the effects of wakalah and ji'alah (α, s) on number of policyholders (n), a role unanticipated in Khan (2015a). In other words, increasing mudarabah significantly reduce number of policyholders but only if both ji'alah is high and wakalah is low; this is not predicted in Khan. As predicted in Khan (2015a), only ji'alah (s) provides an incentive for the operator to control costs. In limited circumstances, wakalah (α) has a negative effect on underwriting effort (e_u), weakly supporting Hypothesis 7a, but contradicting Hypothesis 7b.

Surprisingly, mudarabah (m) provides no discernible positive incentives, even for proportion of average technical reserves invested (k). So, it has no effect on the amount invested (k). There is only ji'alah (s) provides a positive incentive for the operator to invest profits. In addition, a fixed salary has no 'gift exchange' impact on operator decisions.

In general, the agency model of Khan (2015a) receives support, with some qualifications, but the gift exchange prediction in Khan (2015b) is not supported.[50]

5.6 Performance Metrics and Welfare

Subject decisions $\{n, e_u, k\}$ are mediating variables for the relationship between compensations $\{\alpha, m, s\}$ and welfares of the participants and operator. In this section we look directly at the relationship between wakalah, mudarabah and ji'alah $\{\alpha, m, s\}$ and welfares.

[50] For the 6-period analysis (see Appendix 12), the results were similar, with the following exceptions.

1) s had no effect on n. Therefore α, s were not substitutes.
2) α had no effect on e_u.
3) The effect of α (s) on k was everywhere negative (positive).
4) m had a positive effect on k, but only when either α or s or both were high.

There are a number of organisational performance metrics that are of interest:

a) Total gross cash inflow to the agency[51], $W + x_P$;
b) Gross cash inflow earned by the operator, excluding the personal costs, W;
c) Net cash inflow earned by the participants, after payments to the operator, x_P ;
d) Net cash inflow per participant, after payments to the operator, x_P/n;
e) Natural logarithm of net cash inflow earned by the participants, after payments to the operator, and after adding the lowest value received to all values to ensure the natural logarithm function is defined, $\ln x_P$;
f) Natural logarithm of net cash flow per participants, after payments to the operator, and after adding the lowest value received to all values to ensure the natural logarithm function is defined, $\ln x_P/n$;

The researcher estimated the following equations:

$$\overline{\theta} = \beta_0 + \beta_1\alpha + \beta_2 m + \beta_3 s + \beta_4 F + \beta_5(\alpha \times m) + \beta_6(\alpha \times s) + \beta_7(m \times s) + \beta_8(\alpha \times m \times s)$$

where $\theta \in$

$$\{W + x_P, W, x_P, x_P/n, \ln x_P, \ln x_P/n, \text{C}\}$$

$\overline{\theta}$ is the average value for the final 3 periods of each treatment for the above performance metrics.[52] The position control variables for both $\overline{n}$ and $\overline{k}$ were included in every regression, since the performance metrics are all affected by both n and k. Each headed column refers to a separate regression equation. Two-tailed p-values are in parentheses below the corresponding coefficients.

[51] The sum of what the participants and the operator get from the business, excluding the personal costs of the operator.
[52] Analyses for the full 6 periods is included in an Appendix 13.

Table 5 - 49: Performance regressions

	$W+x_P$	W	x_P	x_P/n	$\ln x_P$	$\ln x_P/n$	C
α	400.2 (0.203)	1578.0 (0.000)	-1177.8 (0.000)	-12.0 (0.26)	-1.163 (0.000)	-0.005 (0.905)	212.2 (0.170)
m	-42.7 (0.884)	59.1 (0.652)	-101.7 (0.644)	0.1 (0.993)	-0.007 (0.970)	0.004 (0.913)	-22.2 (0.877)
s	1057.2 (0.000)	907.2 (0.000)	150.0 (0.495)	1.4 (0.885)	0.090 (0.609)	0.005 (0.884)	520.5 (0.000)
F	-172.6 (0.556)	1053.0 (0.000)	-1225.6 (0.000)	-39.0 (0.000)	-0.049 (0.780)	-0.099 (0.007)	-89.5 (0.534)
$\alpha \times m$	99.4 (0.791)	-56.4 (0.736)	155.8 (0.580)	-0.2 (0.987)	0.104 (0.643)	-0.007 (0.878)	44.7 (0.808)
$\alpha \times s$	-626.0 (0.095)	-626.1 (0.000)	0.1 (1.000)	-1.2 (0.926)	0.196 (0.385)	-0.008 (0.862)	-326.4 (0.077)
$m \times s$	-60.0 (0.890)	-175.4 (0.365)	115.4 (0.723)	1.8 (0.905)	0.011 (0.967)	-0.001 (0.981)	-47.3 (0.824)
$\alpha \times m \times s$	65.1 (0.903)	243.7 (0.306)	-178.6 (0.656)	-1.6 (0.930)	-0.180 (0.576)	0.004 (0.947)	62.2 (0.812)
$\bar{R}^2$	0.226	0.590	0.372	0.053	0.376	0.001	0.229
F-value	5.60 (0.000)	23.67 (0.000)	10.36 (0.000)	1.88 (0.001)	10.49 (0.000)	1.02 (0.438)	5.68 (0.000)

A Pareto gain is an improvement in the welfare of at least one person *without* any other individual being worse off. Ignoring risk, a necessary condition for a Pareto gain is an increase in $W - C + x_P$. It is necessary because if there is no increase in $W - C + x_P$, then any increase in the welfare of one individual must come at the expense of the welfare of some other individual. It is not sufficient, because an increase in $W - C + x_P$ does not imply that no individual loses out. If the researcher consider risk, it is possible to achieve a Pareto gain through improved alignment of payoff shares to risk attitudes, even if $W - C + x_P$ is reduced.

The results of the performance regressions are summarised in table above. It can be seen from the data in the table that wakalah helps the operator but the policyholders are worse off. Gift exchange does the same thing where it helps the operator as they get a free lunch but the policyholders are worse off too. There is only ji'alah which offers a Pareto improvement because again the operator is better off and the policyholder is not worse off. Therefore, there was a gain there but all of the gain goes to the operator. For mudarabah incentive, it has no effect on welfare at all.

From the data in the table above as well shows the negative coefficient for the interaction term in the regression for takaful operator's compensation (W). It shows a negative relationship between wakalah-ji'alah $(\alpha \times s)$ and operator compensation where high wakalah and jialah decrease the operator compensation. Refer to table above, under the column W, it shows that wakalah (α) is improved, as well as ji'alah (s) is improved. But if they both improve together, it's not additive i.e. they don't get the sum of the two. In other words, takaful operator's compensation is significantly enhanced by increasing wakalah or ji'alah. But the increases are not additive, not a sum of the two effects.

5.6.1 Gross Participants' Fund

$W + x_P$ measures the gross surplus, to be divided between operator and participants. The results in Table 5 - 49 indicate that only ji'alah (s) is a significant positive determinant of gross surplus, with an estimated coefficient of 1057.2. Wakalah and mudarabah (α, m) have no significant effect on overall surplus. In fact, high wakalah reduces the positive impact of ji'alah (s): the coefficient of $\alpha \times s$ is -626.0, with *p*-value of 0.095.[53]

5.6.2 Aggregate Effort Supplied by the Operator

Although the set $\{n, e_u, k\}$ proxies the *mix* of effort, *aggregate* effort can be proxied by the operator cost function:

$$C = 5n + 0.5ne_u + 0.02I$$

Only ji'alah (s) is a significant positive determinant of aggregate effort, with an estimated coefficient of 520.5 as shown in Table 5 - 49. Wakalah and mudarabah (α, m) have no significant main effect, and high wakalah reduces the positive impact of jialah (s): the coefficient of $\alpha \times s$ is -326.4, with *p*-value of 0.077.[54]

Increasing ji'alah (s) adds to $W - C + x_P$ when α is low by 1057.2 - 520.5 = 536.7 and when wakalah (α) is high by (1057.2 - 520.5) - (626.0 - 326.4) = 237.1. Hence, ignoring

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[53] However, the VIF statistics were all above 10 for $\alpha, \alpha \times s, \alpha \times m, \alpha \times m \times s$ indicating a degree of multicollinearity, which might have contributed to the insignificance of the associated coefficients, though the coefficient of $\alpha \times s$ was significant with a VIF of 10.49. The only other high VIF was for $m \times s$. The results for the 6-period averages are similar, except that there is no interaction effect.

[54] However, the VIF statistics were all above 10 for $\alpha, \alpha \times s, \alpha \times m, \alpha \times m \times s$ indicating a degree of multicollinearity, which might have contributed to the insignificance of the associated coefficients. Yet the coefficient of $\alpha \times s$ was significant with a VIF of 10.49. The only other high VIF was for $m \times s$. The results for the 6-period averages are similar, except there is no interaction effect.

risk, increasing ji'alah (s) might lead to a Pareto gain, but increasing wakalah (α) or mudarabah (m) or both cannot lead to a Pareto gain.[55]

5.6.3 Distribution of Gross Surplus

Operator's compensation, W, is significantly enhanced by increasing wakalah or ji'alah $(\alpha$ or $s)$ estimated coefficients respectively are 1578.0 and 907.2. But the increases are not additive: the estimated coefficient of $\alpha \times s$ is -626.1 and significant.[56]

As might be expected, the operator is made significantly better off when it is given a gift of 1000 (the estimated coefficient is 1053.0). Therefore, it is not significantly different from 1000. (p-value is 0.41, so not a significant result). In addition, no other variables are significant.[57]

When it comes to the share of the fund received by participants, in aggregate the gift makes them significantly worse off by 1225.6. Hence the gift is a pure transfer of wealth from participants to operator and does not represent a Pareto gain.[58] However, while the participants in aggregate are significantly worse off when the operator is paid more in wakalah (estimate = -1177.8, p-value = 0.000), they are neither better nor worse off when the operator is paid more in ji'alah (estimate = 150.0, p-value = 0.495).[59] This suggests that offering higher ji'alah (s) represents a Pareto gain, with all of it going to the operator, but offering higher wakalah (α) represents a mere transfer of wealth from the body of participants to the operator.[60]

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[55] For the 6-period averages, the increment to $W - C + x_P$ resulting from increasing s is 869.4 - 427 = 442.4. The conclusion is similar to that for the 3-period averages.

[56] Of course, the same VIF statistics were above 10. But despite this, note that the coefficients for α and $\alpha \times s$ were both significant, giving some confidence that the insignificant estimated coefficient for α in the regression of $W + x_P$ is unaffected by multicollinearity. It should also be noted that the addition of the estimated coefficients across rows for regressors in columns 2 and 3 are equal (except with occasional rounding error) to the estimated coefficient in column 1, giving additional confidence that the estimates are stable. Results for the 6-period averages are similar.

[57] The estimated coefficient of 1053.0 is not significantly different from 1000. The t-test is (1053.0 - 1000)/130.7268 = 0.41. The results for the 6-period averages are similar.

[58] The estimated coefficient is not significantly different from -1000. The t-test is (-1225.6 +1000)/218.7287 = -1.03. The results are the same for the 6-period averages.

[59] The results are similar for the 6-period averages.

[60] The conclusion is the same for the 6-period averages.

When the researcher looks at the share of the fund *per participant*, x_P/n, there is a dilution effect from increased n when wakalah (α) is high, which spreads the aggregate loss amongst more participants, rendering individual losses insignificant. By this measure of performance, increasing wakalah (α) may result in a Pareto gain.[61]

To take account of risk attitudes, the researcher assumed participants were risk averse, since they seek insurance, and estimated a regression of $ln x_P$ and of $ln\, x_P/n$. In aggregate, participants are significantly worse off from increasing the value of wakalah, but for individual participants, the loss is insignificant.[62] Individual participants are significantly worse off from bestowing a gift on the operator, but the effect vanishes in the aggregate. There are no other significant effects. In particular, increased ji'alah (s) does not lower the welfare of the participants.[63]

Overall, evidence suggests that by aligning the incentives of operator and participants, ji'alah may produce a Pareto improvement, and it is the operator that benefits. Wakalah may result in a Pareto gain if the welfare of participants is estimated on an individual basis, rather than an aggregate basis. There is no gift exchange or mudarabah effect. A gift to the operator is a pure transfer of wealth from participants to operator. The gift exchange effect suggested in Khan (2015b) is not found. The conclusion in Khan (2015a) that ji'alah should always be offered is supported.

5.7 Conclusion

The implications of the research findings for regulators give partial support to Khan (2015a) in that *only* ji'alah offers a Pareto gain to the agency as a whole, though in contrast to Khan (2015a). In addition, the evidence in favour of including wakalah in a hybrid contract is weak. And there is no clear evidence of 'gifts' being reciprocated by better alignment of operator decisions with the welfare of policyholders, in contrast to Khan (2015b).

[61] The loss per participant for the 6-period averages is small but significantly negative at -14.3. Thus, ignoring risk, increasing α probably does not give rise to a Pareto gain.
[62] The operator's shareholders are assumed to be risk-neutral, since their investments are likely to be well-diversified. The results are similar for the 6-period averages.
[63] The results are similar for the 6-period averages.

CHAPTER 6

SUMMARY AND RECOMMENDATIONS FOR FURTHER RESEARCH

6.1 Summary of Findings

In the takaful industry, there is a complete separation of ownership of the residual funds of policyholders from their control, which rests solely with the operator. Policyholders are therefore in a classic principal-agent relationship with the operator, with obvious potential for agency costs. A major problem with this relationship is that the principal is unable to observe the true effort exerted by the agent leading to the well-known moral hazard problem. There are also distributional concerns because the operator sets its own compensation.

A case can therefore be made for regulation of the industry, to protect the interests of policyholders. The takaful operator's compensation scheme is primarily determined by board of directors of the takaful company, though it may need to be approved by the Shariah Supervisory Board and the country's regulatory authority. There is, however, a lack of guidance as to which compensation scheme to choose from, as pointed in the World Takaful Report by Finance Forward (2016).

One way to reduce agency costs is by appropriately designed monetary incentives to the operator. Only Khan (2015a, 2015b) has looked at this question in the context of takaful operations. The present study reports the results from a laboratory experiment, designed to investigate the effect on decision making of different forms of compensation, in a multi-task setting involving decisions on the size of the pool of policyholders, on cost control, and on investment of technical reserve. The study also offers a stress test of theoretical predictions in Khan (2015a) and seeks evidence of the gift exchange phenomenon discussed in Khan (2015b). In these two papers, Khan examines three forms of compensation: sales commission (wakalah), sharing of investment profit (mudarabah), and sharing of residual funds (ji'alah). All three forms of compensation can be observed in practice, sometimes in concert, though in some regulatory jurisdictions some of them have been prohibited or restricted. Khan's (2015a) analysis suggests the optimal compensation package features wakalah and ji'alah, but the conclusions have not before been subject to empirical validation.

The conclusions of the present study are:

a) Only ji'alah increases operator's aggregate efforts.

b) High wakalah reduces the positive effect of ji'alah on effort.

c) Wakalah and ji'alah are substitutes for increasing the pool of policyholders.

d) Only ji'alah provides an incentive for the operator to control costs.

e) Only ji'alah provides a positive incentive for the operator to invest profits.

f) Mudarabah provides no discernible positive incentives.

g) A fixed salary has no 'gift exchange' impact on operator decisions.

h) Increasing wakalah benefits the operator, but at the expense of policyholders.

i) Increasing mudarabah has no impact on welfare.

j) Increasing ji'alah offers a Pareto gain, with the operator benefitting, but *not* at the expense of policyholders.

k) Increasing the fixed salary offered to the operator (offering a 'gift') benefits the operator, but at the expense of policyholders.

The implications of these findings for regulators give partial support to Khan (2015a) in that *only* ji'alah offers an efficiency gain to the agency as a whole, though in contrast to Khan (2015a), the evidence in favour of including wakalah in a hybrid contract is weak. And there is no clear evidence of 'gifts' being reciprocated by better alignment of operator decisions with the welfare of policyholders, in contrast to Khan (2015b).

6.2 Discussion on Theoretical and Practical Implications

The agency problem is found to be mitigated by incentives alignment through takaful operator compensation arrangements. There may be a need for regulation to play a role in the design of the optimal incentive schemes because takaful participants are not able to select the incentive schemes, wakalah (sales commission), mudarabah (sharing of investment profit), and ji'alah (sharing of residual funds). In order to accomplish that objective, this study's empirical work employs a theoretical model by Khan (2015a) by investigating the form of compensation received by takaful operators in alleviating problems embedded with the principal-agent relationship.

As far as it is concerned, this model has not been subjected to any empirical testing which this study is conducted. Additionally, this study examines the recent theme of gift-exchange theory in dealing with the provision of optimal incentives for agents. In this theory, employers give employees a gift of a wage above the market-clearing level and employees reciprocate with a gift of effort above the enforceable level. Gift-exchange can be studied by comparing the effects of increasing wakalah on the components of gross profit with the prediction from agency theory in Khan (2015a).

This study is motivated primarily by the need to improve the understanding of the takaful contracts that emerge when takaful operator opts to behave according to the performance incentives. While the literature provides evidence that there is a lack of credible industry data, there is also a lack of the regulation that impose standard to the takaful industry. As a result, this study extends to a specific contribution to provide finer data through experimental research for examining the effect of the three types of incentives schemes on takaful operator performance using the existing theoretical model. This study also adds to the body of knowledge on multiple task agencies because there are three types of incentive schemes which require three distinct tasks: increasing the number of policyholders, managing underwriting effort, and investing technical reserve, which represent more complex action choices on the side of the agent. Therefore, this study also offers a novel setting for testing agency theory, involving 3 tasks with 3 main forms of compensation.

It was anticipated that this study will have repercussions for accounting theory and practice. This study illustrates how the agent is motivated by different contractual forms. This study suggests that regulation should play a role to protect takaful participants' rights because they are not effectively represented and overseen by shareholders. Collectively, this study was anticipated to contribute in three following ways.

First is theoretical contribution on agency theory. Agency theory helps in determining the optimal arrangement of contract between agent and principal, also mitigates moral hazard problems. Consequently, this study provides evidence whether the optimal contract practices is effective as theory advocates. Additionally, it offers a novel setting for testing agency theory involving 3 tasks. Thus, this would be one of the first experimental studies on 3-task settings. Additionally, Khan's theoretical model on the optimal incentives for takaful is used in this study; however, no empirical investigations have used it to test its validity.

Second is methodology contribution. Khan (2015b) employed dummy variables for mudarabah and ji'alah incentives in his study. Problem with dummy variable – in this case (for mudarabah and ji'alah) is a weakness since these two variables contain values rather than being zero. As a result, by replacing that amount with 0 or 1, he was measuring inaccurately, causing all of the coefficient results to be biased estimated. Consequently, Khan's empirical result could be inaccurate. In order to obtain an unbiased estimation result, this study uses a laboratory experiment to produce data and replace the values of 0 and 1 with actual values.

Third is contextual contribution i.e. takaful industry itself, where practitioners and prior literature have criticised the lack of takaful regulation to establish regulatory policy. The role performed by corporate governance and regulation is particularly crucial in takaful due to the potential misalignment of stakeholder interests. When underwriting and investment risks are wholly borne by participants in a takaful operation, it is crucial to ask who looks out for their best interests. It is advisable to have a strong corporate governance framework in place rather than relying too heavily on regulations because the regulations are unlikely to cover all that could go wrong in a takaful setting. However, the regulator has to have sufficient regulations for takaful in place given the lack of a standard for how takaful should be structured and the lack of skilled human resources in takaful.

Even worse, participants are not represented on the board of directors. Even if participants were represented on the board, conflicts could arise between the different board members representing shareholders and participants, as their interests may not be aligned. Therefore, should the Shariah Supervisory Board be responsible for protecting the interests of participants rather than the board of directors? What regulatory role should the Shariah Supervisory Board take on? This study provides insight to the regulators with evidence for understanding the role of performance incentives play in the takaful. It is well known that the takaful participants are unable to choose the incentives or contract on their own, thus regulation needs to play a role in designing optimal incentive schemes. In addition, regulators need to take as strong a position as possible because the current framework does not protect policyholders sufficiently.

The study discovered that only jialah offers an efficiency gain to the agency as a whole. In Khan (2015a), he claimed that a hybrid of wakalah and ji'alah should be recommended; nevertheless, this study discovered that inclusion of wakalah is at the expense of the policyholders. With ji'alah alone, it put the operator was better off and that policyholders were not worse off. Mudarabah is very weak incentive, it has no discernible effects, even for proportion of average technical reserves invested. Consequently, it has no effect on the amount invested. Only ji'alah offers a positive incentive for the operator to invest profits. In addition, a fixed salary has no 'gift exchange' impact on operator decisions.

There's no good empirical evidence in the naturally occurring world (annual reports). The current study now has empirical data derived from a controlled lab experiment. Additionally, this study offers a more realistic setting than Khan, where he has several flaws in his theoretical framework.

6.3 Recommendations and Limitation

The researcher presents the findings and keeping in mind certain limitations that may have existed while conducting the study. The limitation is discussed now. One limitation of the current study is that it examines the behavioural effects of wakalah, mudarabah and ji'alah for a limited set of parameters, although it does cover the range of compensation forms observed in practice. Replication with different parameter values would permit conclusions concerning the robustness of this study's results. Another way could be to have more parameters instead of two values of each compensation.

A second limitation was that the behavioural responses of a regulator, acting for participants, to the decisions taken by the operator, were not examined here. Some subjects in the present study remarked after the experiment that they had chosen to maximise their own payments, to the detriment of the participants, because the latter were not 'real'.[64] An extended lab experiment, with subjects working in operator-regulator

[64] Related to this consideration is the omission during the experiment of proper accounting for the gift to the operator. Due to an oversight, the gift of 1000 was not deducted from the net surplus of the participants, but appeared as if 'from nowhere'. This might affect the interpretation placed on the lack of reciprocal gift exchange, because the apparent gift came, not from the 'policyholders' but *gratis* from the experimenter. However, given the fact that some subjects explicitly recognised this was a computer-subject interaction rather than a subject-subject interaction, the effect of the omission is unlikely to be crucial, because, as they identified, there was no genuine notion of the 'welfare of participants'. The accounting was fixed in the above data analysis. But because the omission might have affected behavioural responses, we also repeated all the welfare regressions, this time without including T5 (LLLH). There was little change to the results (refer an Appendix 14). The only changes were to make significant the negative effect of wakalah on the

dyads, would be an interesting exercise to explore the behavioural implications of wealth transfers. Such an extension links more closely with the literature on bargaining, fairness and reciprocity.

This research acknowledges that taking into account the study's sample size may be necessary when interpreting the findings and questions if the conclusions drawn from 79 students are robust enough to be generalised. The sample size of 79 is observed to be greater than sample sizes in prominent articles from top journals. There were 40 subjects (Sprinkle, 2000), 77 subjects (Brüggen & Moers, 2007; Davis et al., 2006) and 94 subjects (Dobbs & Miller, 2009) in prior studies. A low sample size would lead to weaker statistical power for detecting significant effects. In this present research, statistically significant results have been obtained. Given that students are not takaful stakeholders, the sample chosen in the experimental method of data collection raises critical concerns, but it also opens up another avenue for further research. There may be room for another study using takaful operators as the subjects. So that's the benefit of experiments where you can replicate the study.

The necessity of strengthening the incentives for takaful operators must be recognised by regulators in takaful market. This would help to improve solvency and ensure better economic returns for both takaful operator and participants. Because the participant frequently lacks financial literacy, misselling is a significant risk. Monitoring and supervision requirements are therefore advised. The relationship between the participant and the takaful should be clear, with regulations requiring the open disclosure of (a) the operator's fee (especially any profit-sharing arrangements) and (b) the takaful's policy regarding payment of surpluses to participants. Malaysia and Saudi Arabia regulate to limit intermediary commissions, but many countries do not (Gonulal, 2012).

The researcher acknowledges that interpretation of the results of the study may need to be tempered by recognition of the inherent limitations of the study. However, the researcher has made an effort to control for these limitations where possible in order to derive reliable and robust results. The researcher believes that this study establishes the foundations for further research to be carried out on the takaful industry, which is anticipated to become one of the major emerging international markets for insurance in the future.

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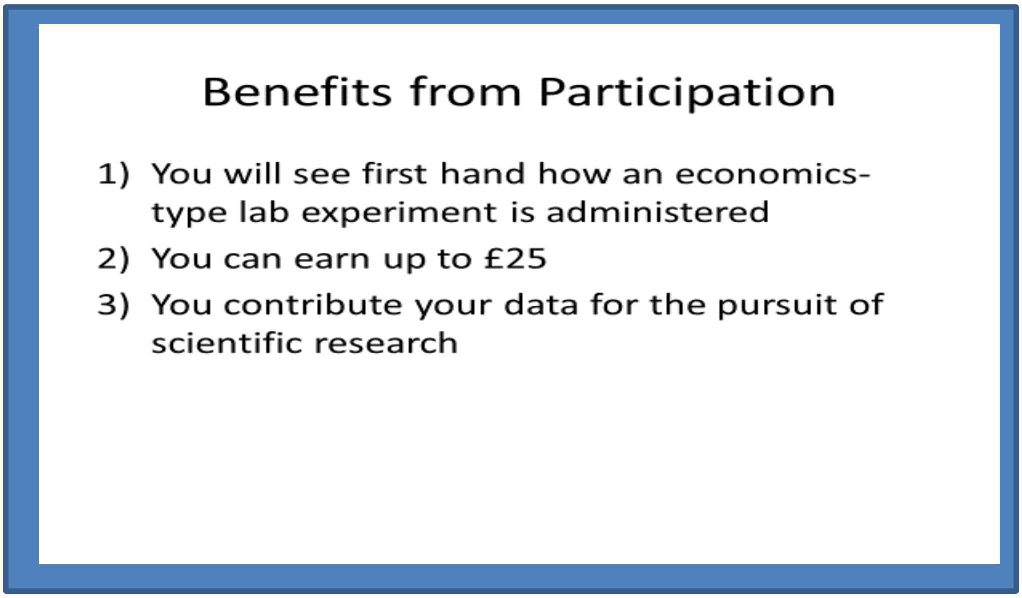
welfare of *individual* participants, thus casting further doubt on the potential for a Pareto gain arising from increasing wakalah.

APPENDICES

APPENDIX 1

Powerpoint presentation inviting participants



Costs of Participation

Approximately one hour of your time

How to Get Involved

Reply to invitation email

If you did not receive an email, let me know and I will re-send it

APPENDIX 2

Email inviting participants in a laboratory experiment

Laboratory Experiment - earn up to £25

Dear Students,

We invite you to participate in a laboratory experiment designed to investigate the decisions people make in response to different forms of compensation. You will be paid for your participation. Your earnings can be anything up to £25: the exact amount will depend on how you perform the experimental task, but also to some extent on luck. Part of your earnings is a £3 participation payment guaranteed to you for showing up on time and taking part. The experiment will last approximately an hour and a half.

To obtain a reasonable sample size, the experiment will be run over a number of stand-alone sessions, at the dates and times shown in the attached document. Each person will attend *one* of these sessions. If you are interested in participating, complete the form attached to this email, and return it within the next 48 hours, to

wan.i.wan-mohamad@durham.ac.uk

We will notify volunteers by email of their individual session dates and times two days in advance. Thank you for your time.

Adilah Wan-Mohamad and Tony Miller

APPENDIX 3

Personal Details Form

(Sponsored by Durham University Business School)

Full Name (please print):
……………………………………………….……………………………………..

Degree Course and Level (Bachelors, Masters PhD, MBA etc):
………………………………………….

Age (in years):
………………………………………………………..……………………………………...

Sex: M or F (Please delete as appropriate)

Nationality:
…………………………………………………………………………………………………….

Participated in a laboratory experiment before? Y or N (Please delete as appropriate)

Email Address:
………………………………...…………………………………………………………

We will undertake statistical analyses to determine whether the experimental data supplied by volunteer subjects is related in any way to the personal characteristics above. Any findings will be published in anonymous form only. In view of data protection requirements, we need you to sign to indicate your consent for these analyses. Your signature is also required for you to be able to participate in the experiment. These signatures will be obtained when you attend the experiment.

In order to organise volunteer subjects into groups, we need to know when you are available. Please indicate with the word 'Yes', all dates and times below at which you will be available.

Monday 11 March 10 am – 12 pm:	………………..
Monday 11 March 2 pm – 4 pm:	………………..
Wednesday 13 March 2 pm – 4 pm:	………………..
Friday 15 March 10 am – 12 pm:	………………..
Friday 15 March 2 pm – 4 pm:	………………..
Monday 18 March 10 am – 12 pm:	………………..
Monday 18 March 2 pm – 4 pm:	………………..
Wednesday 20 March 10 am – 12 pm:	………………..
Wednesday 20 March 2 pm – 4 pm:	………………..

We will inform you by email of date, time and venue when we have assigned you to a group.

APPENDIX 4

Email assigning volunteers to session

Dear Student,

Thank you for volunteering to participate in a laboratory experiment at Durham University Business School. You have been assigned to the session due to take place at **[Insert time]** on **[Insert Day and Date]** in Room **[Insert Room Number and Location]**. Please arrive promptly so we can start on time. Bring with you your student smart card and a pen. A calculator is optional.

I hope you find the experiment interesting and rewarding.

Adilah Wan Mohamad & Tony Miller

APPENDIX 5

Consent Form

<u>Laboratory Experiment – Consent Form</u>

(Administered by Adilah Wan Mohamad

Durham University Business School

11 March 2019 – 20 March 2019)

We will undertake statistical analyses to determine whether the experimental data supplied by volunteer subjects is related in any way to their personal characteristics. Any findings will be published in anonymous form only. We need your consent for your participation and for our use of your data in subsequent statistical analysis. Please complete the information below.

<u>Statement of Consent</u>

I have read the above information. I consent to participate in this study and for use of the data I have supplied in anonymous form in statistical analysis.

Print name: ……………………………………………………………………………………..

Student ID on Smart Card: ………………………………………………………………………..

Signature: ………………………………………………………………………………………

Date: ………………………………………………………………………………………….

APPENDIX 6

Instructions to participants for lab experiments

INSTRUCTIONS FOR LAB EXPERIMENT

1. Materials

A copy of the instructions (this document), and some paper for you to write on are provided. These materials should be returned to the instructor at the end of the experiment. You should also have brought with you a pen and, if you wish, a calculator.

2. Rules of Communication

Our purpose in conducting this experiment is to gain information about individual behaviour rather than group behaviour. For this reason, we must insist on the following rules:

(i) There must be no communication about the experiment during a session, or afterwards, until all the experimental sessions have been completed,

(ii) The only clarifications you may seek are those concerning use of software in the computer room. If you have difficulty using the software, raise your hand and wait for assistance from the instructor.

3. Introduction

You will be taking part in a computerised experiment designed to investigate the nature of individual decision-making under conditions of uncertainty. You will be paid for your participation. Your earnings can be anything up to £25: the exact amount will depend upon how you perform the experimental task, but also to some extent on luck. Part of your earnings is a £3 participation payment that is guaranteed to you for showing up on time and taking part in the experiment. Your earnings will be calculated and then paid in cash, privately, as notified at the end of the experiment. I will first explain the experimental task and then how you can earn money from performing this task.

4. The Experimental Task

The purpose of the study is to understand the decisions people take in response to different forms of compensation. The decisions that you take during the experiment will be input into a computer and stored in an electronic file. The researchers will *not* know the identities of subjects when the analysis is performed. Each subject will be identified only by a number.

We are inviting you to play the role of a person doing work for a business organisation. You will perform a number of tasks, and we would like you to try to perform those tasks in such a way that the business organisation is successful. Even though you are role-playing, we will nevertheless pay you real money for performing the required tasks, according to the following rules of the experiment. The experiment will operate with artificial money called 'francs', but the total francs you earn will be converted later into real pounds sterling, using the rate published later in this document.

You need to know details of: a) how the success of the business organisation is measured; b) what tasks are required from you; c) how you can earn money; and d) how the experiment will be conducted. We turn to these issues now.

a) How the Success of the Business Organisation Is Measured

i) The business receives 100 francs for every customer it serves. A sales commission, at a rate notified from time to time during the experiment, will be paid to you. The total ***net revenue*** to the business will therefore be equal to:

$$(100 - sales\ commission\ per\ customer) \times number\ of\ customers$$

ii) The cost to the business of serving its customers is not fully predictable. The *average* cost per customer is known, but there will usually be a random cost difference from this average. ***Total costs*** to the business are then equal to:

$$average\ cost\ per\ customer\ \times number\ of\ customers$$
$$+ cost\ difference\ from\ average \times square\ root\ of\ number\ of\ customers$$

The cost difference from average ranges between -30 and +30 francs, with all values within this range equally likely to occur. For example, if the number of customers is 25, average cost per customer is 90, and the cost difference from average is -10, then total costs will equal:

$$90\ \times 25 +\ (-10) \times \sqrt{25} = 2200$$

iii) A fraction of ***total operating profit***, defined as total net revenue minus total costs, can be invested to earn extra profit for the business. The rate of return on investment varies between -3% and 27%, with all rates within this range equally likely to occur. A share of the return on investment, at a rate notified from time to time during the experiment, will be paid to you. The total ***net return from investing*** the business receives will therefore be equal to:

$$(actual\ rate\ of\ return \times amount\ invested) -\ share\ paid\ to\ you$$

iv) A share of the sum of total operating profit and net return from investing, at a rate notified from time to time during the experiment, will be paid to you. The amount remaining after payment of your share is *final profit*, a measure of the success of the business.

b) What Tasks Are Required from You

You have three tasks.

i) You must decide the number of customers. You may choose any whole number between 1 and 100.
ii) You can reduce the level of average cost per customer by any whole number amount up to 50. If you choose a reduction of zero, average cost per customer will be 90 francs.
iii) You must choose the fraction of operating profit to be invested. You may choose any decimal fraction (up to one decimal place) between 0 and 0.5. Note, however, that if total operating profit is negative, the proportion will be set for you at zero.

c) How You Can Earn Money

In your role as subject, there are both *personal* rewards you can earn and *personal* costs you will incur. The personal costs will be fixed for the duration of the experiment. The personal rewards will vary, but will always be notified to you in advance of any decisions you take.

i) The personal costs are as follows:

Cost 1: Every customer you choose for the business will cost you 5 francs.
Cost 2: A reduction of 'average cost per customer' for the business by one franc will cost you 0.5 francs per customer.
Cost 3: Every franc of total operating profit you choose to invest for the business will cost you 0.02 francs.

For example, if you choose 50 customers, reduction of average cost per customer by 10 francs, and investment of 500 francs of total operating profit, your personal costs will be:

Cost 1	$50 \times 5 = 250$
Cost 2	$10 \times 0.5 \times 50 = 250$
Cost 3	$500 \times 0.02 = 10$
Total Personal Costs	$250 + 250 + 10 = 510$

ii) Your personal rewards, which will be notified to you from time to time during the experiment, are:

A. Sales commission.
B. A share of the return on investment earned by the business.
C. A share of the sum of total operating profit and net return from investing.
D. A fixed sum.

Individual rewards, A, B, C and D, will never be negative. Hence, if the return on investment is negative, Reward B will be set at zero, and if the sum of total operating profit and net return from investing is negative, Reward C will be set at zero.

Your earnings each period will be the total personal rewards minus the total personal costs. If this comes to a negative amount, earnings will be deemed to be zero so that you never owe us any money.

d) How the Experiment Will Be Conducted

In each decision period of the experiment, you will be notified of Rewards A, B, C and D on the computer screen. You will be asked to input your decisions concerning the three required tasks. Finally, an account, showing your personal earnings will be displayed, as the sum of Rewards A, B, C and D less your personal costs. The final profit of the business will also be displayed for your information.

For each set of Rewards A, B, C and D, there will be six identical decision periods. Then the set of Rewards will be changed and held constant for another six periods, and so on. The total number of decision periods will be 54. Your cumulative personal earnings will be shown each time the earnings for a decision period are calculated.

5. Pre-Testing & Practice Periods

In order for you to familiarise yourself with the experiment, there will be a series of questions presented in an Excel spreadsheet to check your understanding. Subjects will not be permitted to move onto the experiment until they have answered all these questions correctly. Following the questions, there will be 6 practice decision periods, three periods with one set of Rewards A, B, C and D, and three periods with a different set of Rewards A, B, C and D. The rewards earned during these 6 periods are reported for information only. They will not contribute to your real money earnings. Cumulative earnings will not therefore be reported during the practice periods.

6. Payments and Completion of the Experiment

When you have finished the experiment, please raise your hand and an instructor will attend to the final procedures. A summary of your earnings in francs appears on the computer screen at the end of the experiment. Your earnings in francs will be converted into pounds sterling at the rate of 0.02 pence per franc. You will sign a document to verify your earnings and a copy will be given to you. The amount of your earnings will be paid to you at an agreed date, time and place a few days after the experiments have been concluded.

7. Experimental Briefing

This experiment is funded by Durham University Business School. A report on the findings of the experiment will be published in due course. All published data collected will, of course, be anonymous. In order to preserve the integrity of the ongoing experiment, we are unfortunately unable to offer any feedback on its nature or your role in it until the whole experiment is complete.

APPENDIX 7

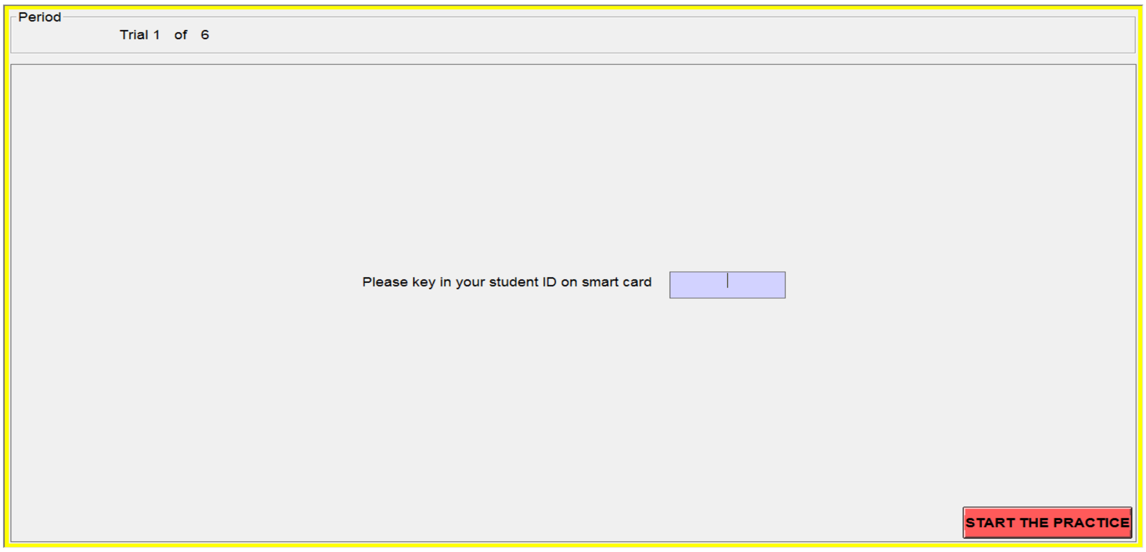
Pre-test questions

		YOUR ANSWER	TRUE/ FALSE	HINT
1	How much does the business receive in revenue per customer?	0	FALSE	REFER NOTE 4. a) i) ON PAGE 2 OF INSTRUCTIONS
2	Which reward, A, B, C or D, is paid to you from business revenue?	0	FALSE	REFER NOTE 4. c) ii) ON PAGE 3 OF INSTRUCTIONS
3	What is the personal cost to you for each additional customer?	0	FALSE	REFER NOTE 4. c) i) ON PAGE 3 OF INSTRUCTIONS
4	What is the maximum average cost per customer for the business?	0	FALSE	REFER NOTE 4. b) ii) ON PAGE 3 OF INSTRUCTIONS
5	What is the maximum reduction you can make in average cost per customer for the business?	0	FALSE	REFER NOTE 4. b) ii) ON PAGE 3 OF INSTRUCTIONS
6	What is the personal cost to you from reducing average cost per customer for the business by one franc?	0	FALSE	REFER NOTE 4. c) i) ON PAGE 3 OF INSTRUCTIONS
7	What is the maximum cost difference from the average for the business?	0	FALSE	REFER NOTE 4. a) ii) ON PAGE 2 OF INSTRUCTIONS
8	What is the maximum percentage rate of return on investment that total operating profit can achieve?	0	FALSE	REFER NOTE 4. a) iii) ON PAGE 2 OF INSTRUCTIONS
9	Which reward, A, B, C or D, is paid to you from the return the business earns from its investment of total operating profit?	0	FALSE	REFER NOTE 4. c) ii) ON PAGE 3 OF INSTRUCTIONS
10	What is the personal cost to you for each additional franc of total operating profit you choose to invest on behalf of the business?	0	FALSE	REFER NOTE 4. c) i) ON PAGE 3 OF INSTRUCTIONS
11	Which reward, A, B, C or D, is paid to you from the sum of total operating profit and net return from investing earned by the business?	0	FALSE	REFER NOTE 4. c) ii) ON PAGE 3 OF INSTRUCTIONS
12	Which reward, A, B, C or D, is paid to you as a fixed sum?	0	FALSE	REFER NOTE 4. c) ii) ON PAGE 3 OF INSTRUCTIONS
	Number of correct answers		0	**TRY IT AGAIN**

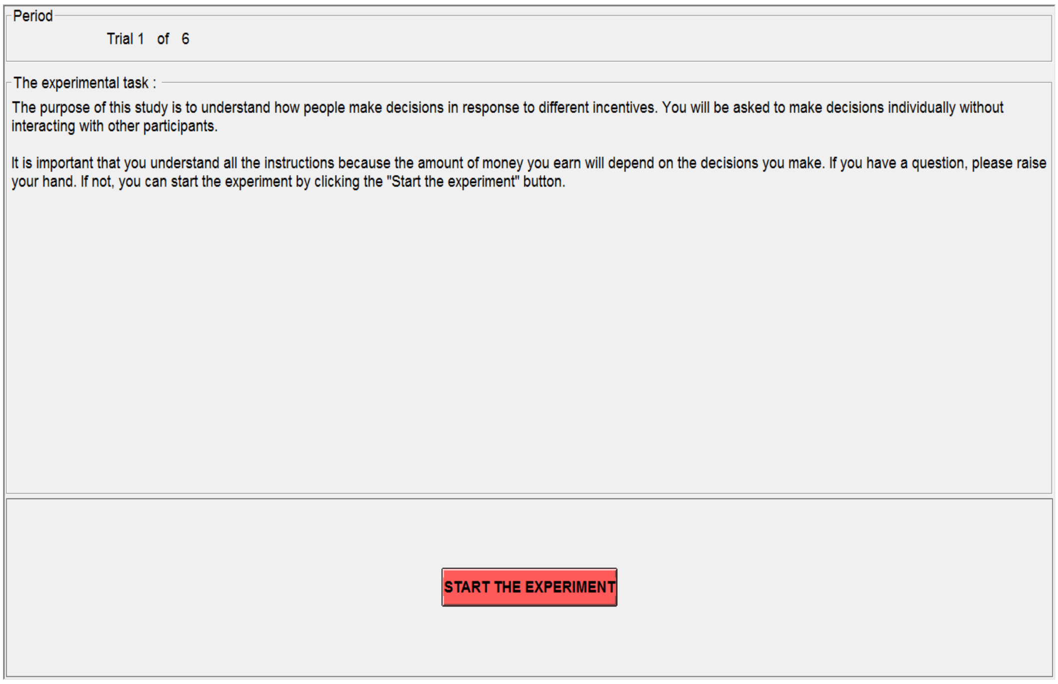
APPENDIX 8

Selected computer screenshots for participants during the experiment

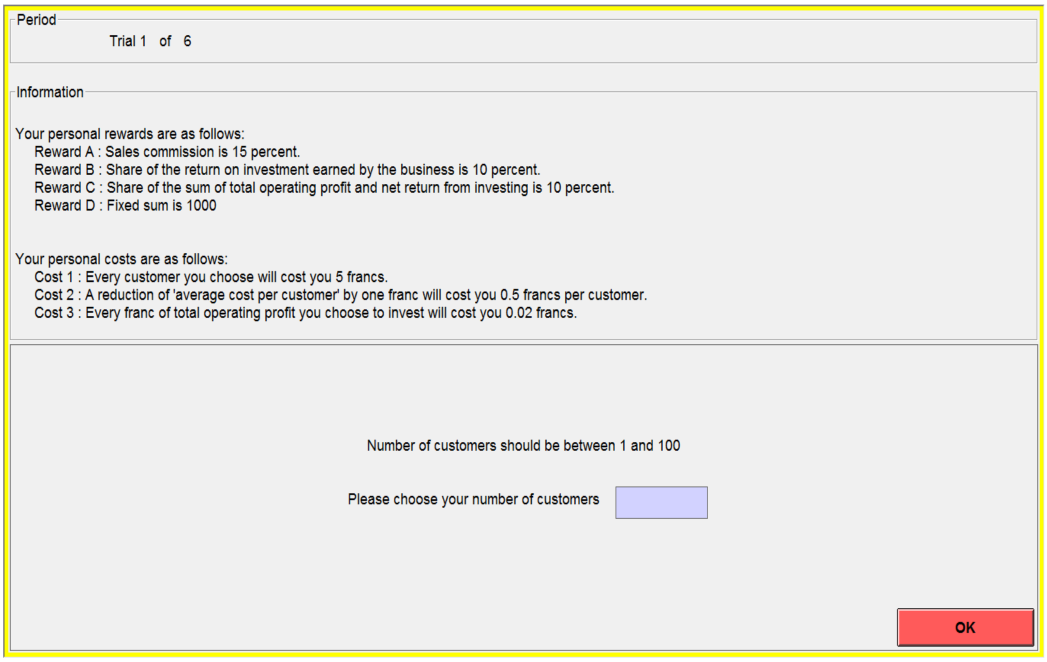
(a) Initial screenshot – Entering personal information.



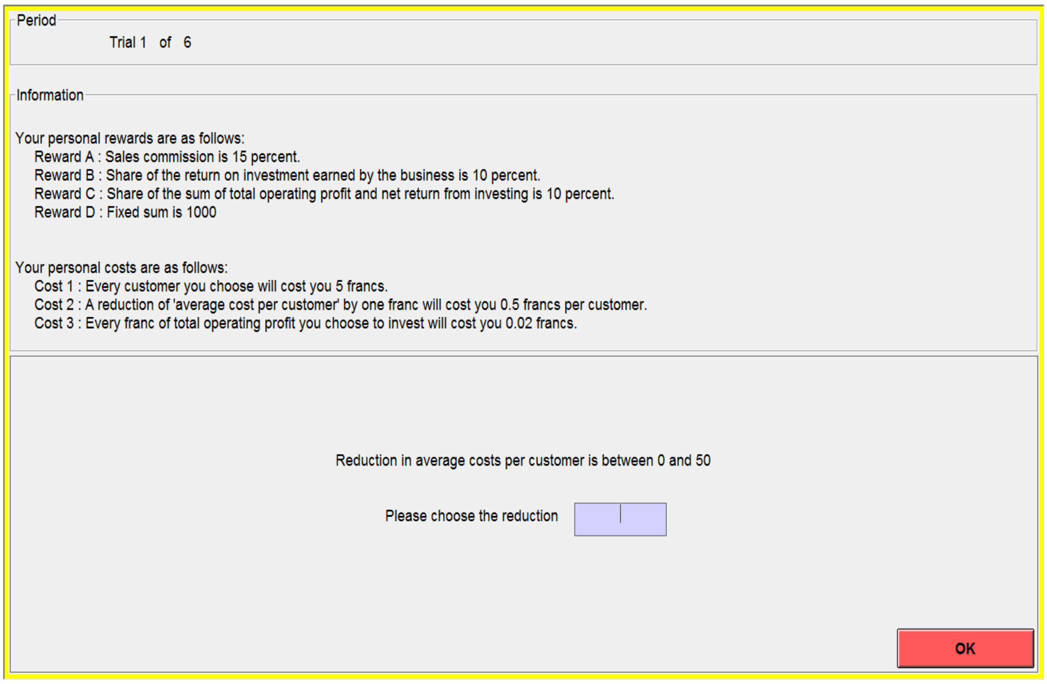
(b) Screenshots the beginning of the start of the experiment.



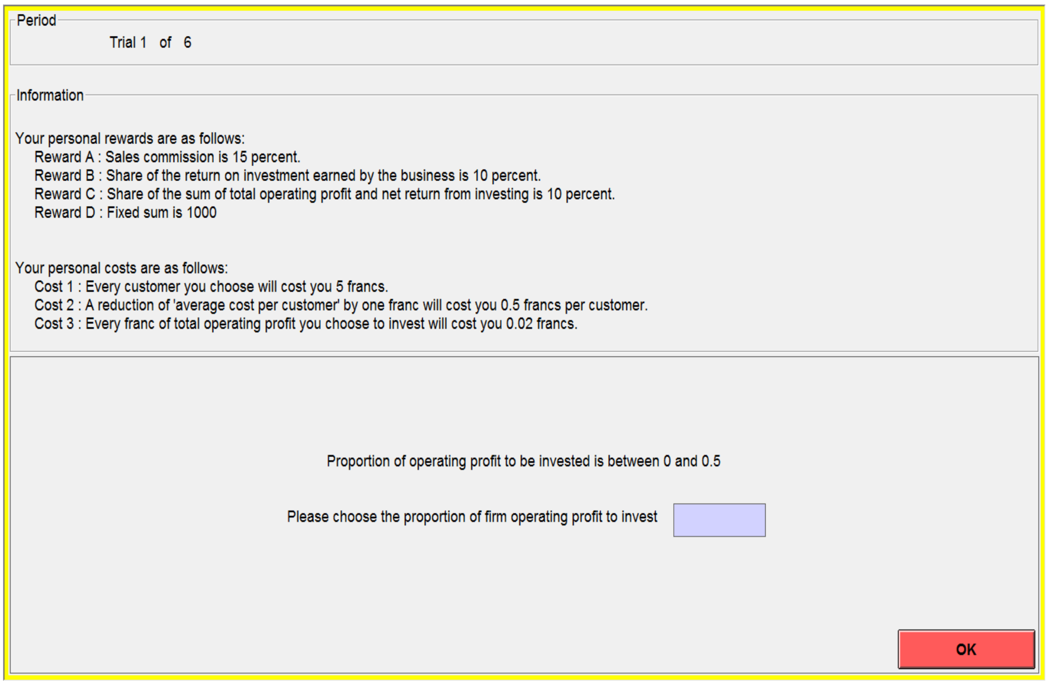
(c) Practice periods – entering decision for Task 1.



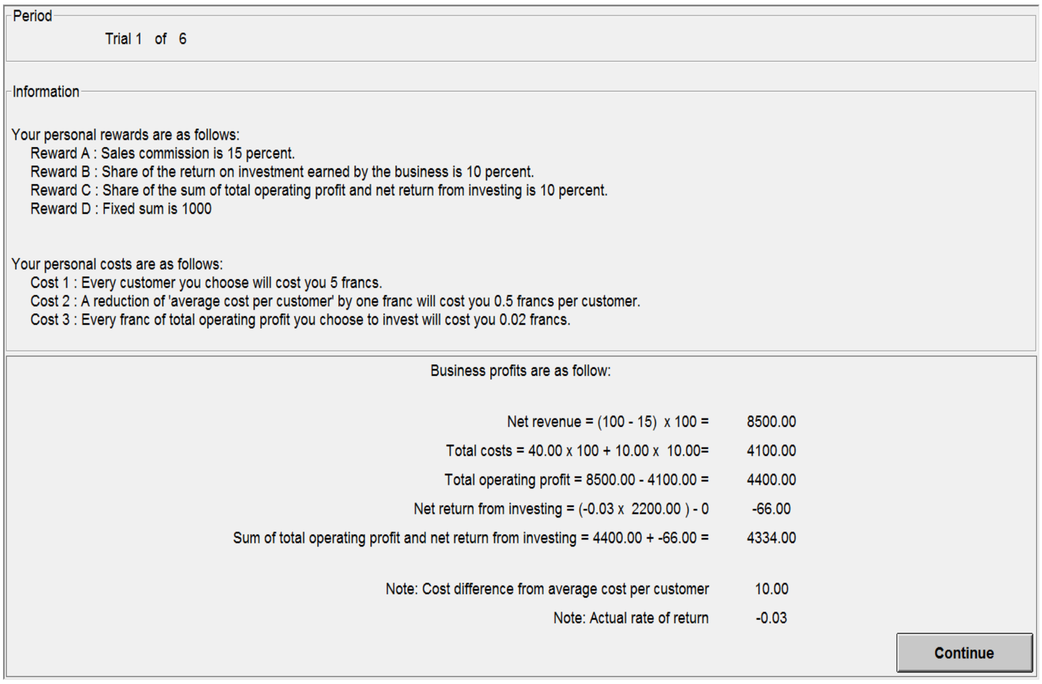
(d) Practice periods – entering decision for Task 2.



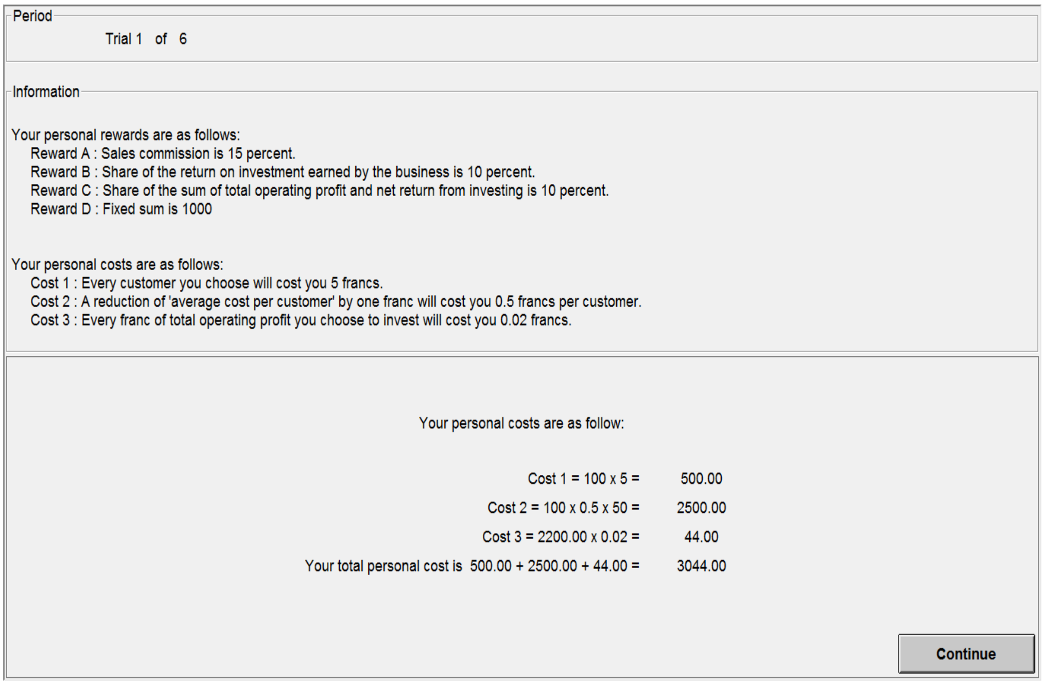
(e) Practice periods – entering decision for Task 3.



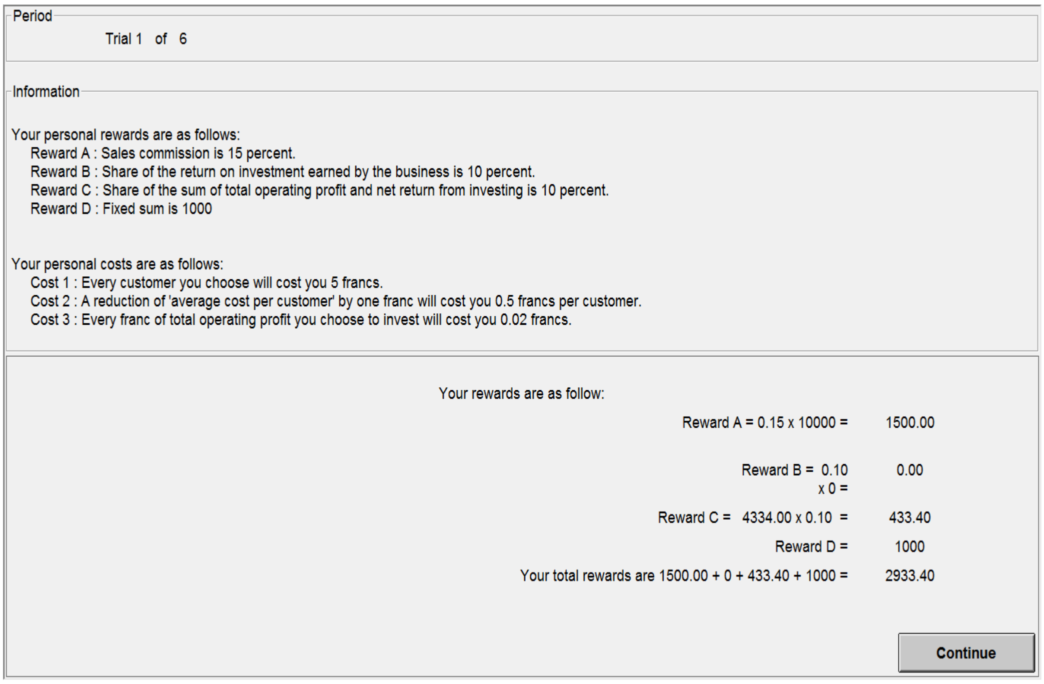
(f) Practice periods – display for business profits.



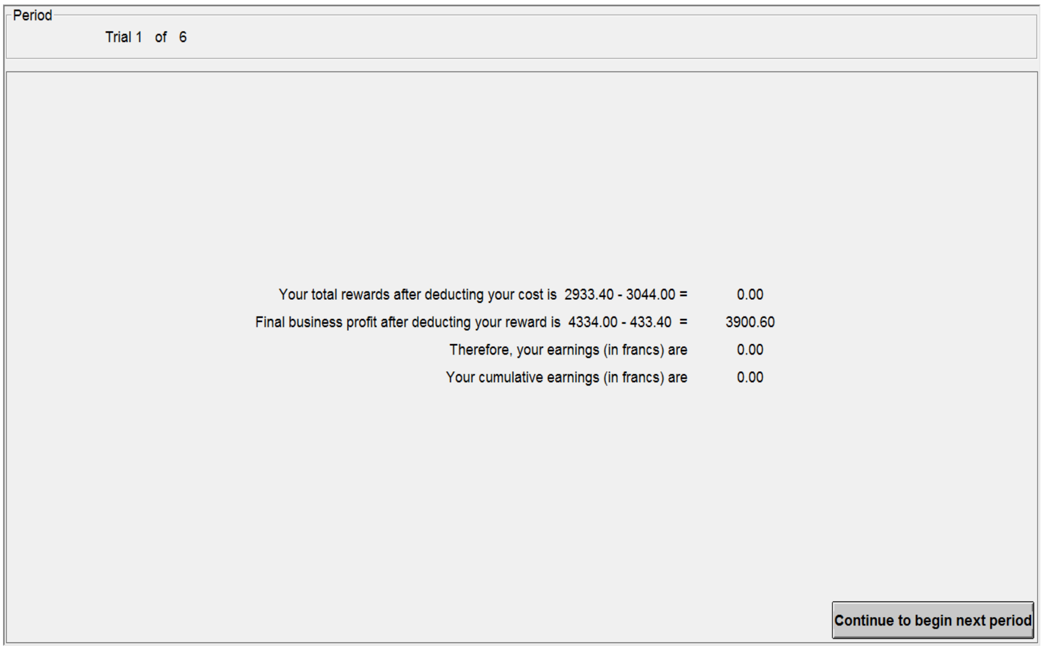
(g) Practice periods – display for agent’s personal costs.



(h) Practice periods – display for agent’s rewards.

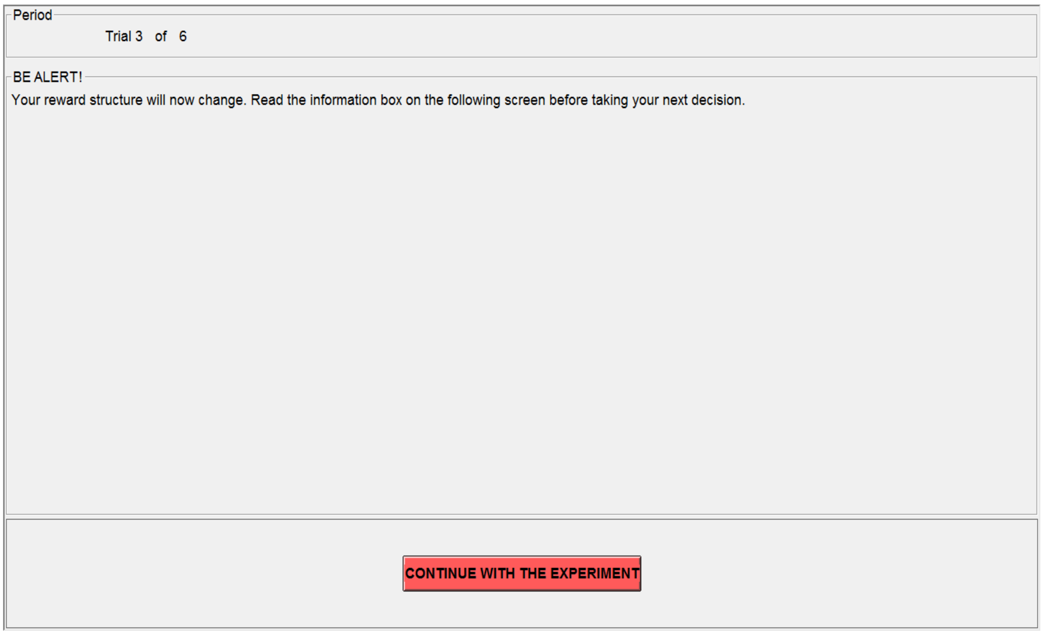


(i) Practice periods – display for agent's earnings and cumulative earnings.

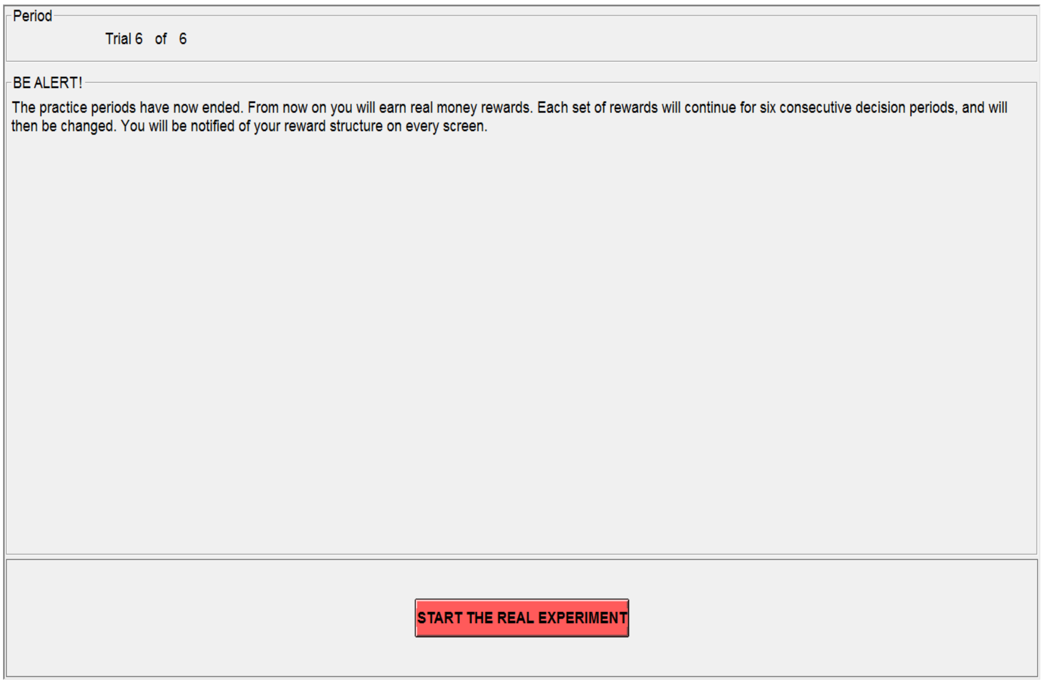


The participant will continue to begin next period from (c) till (i) for next consecutive three periods (for practice) or six periods (for real experiment).

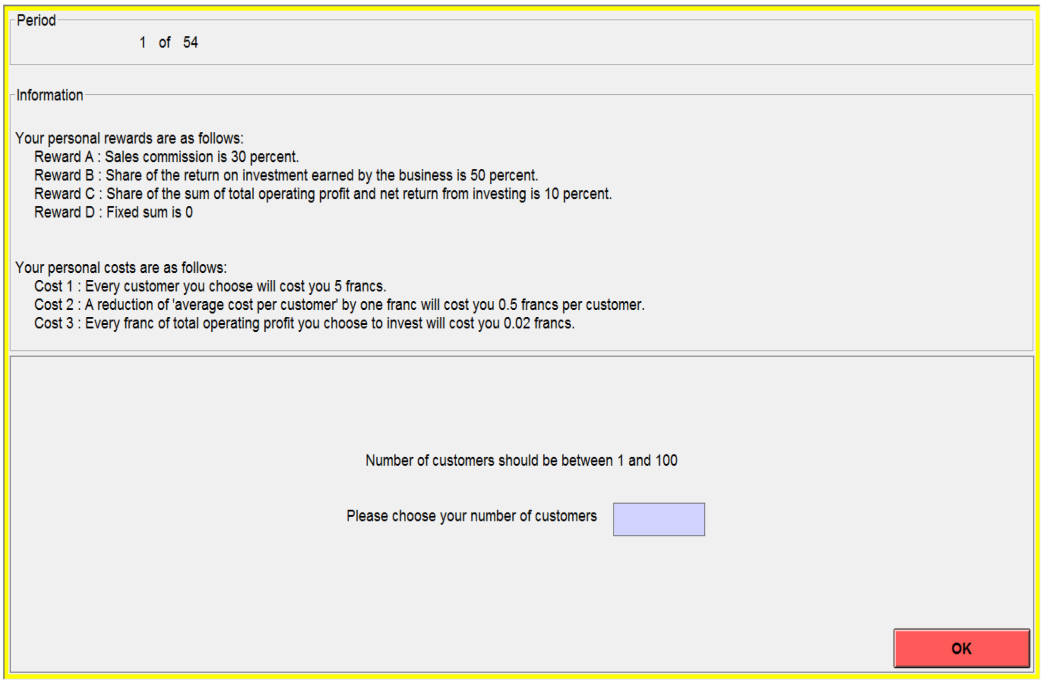
(j) Notification of changing the reward structure will appear before the participant continues with new set of Rewards A, B, C and D; and held constant for another three periods (for practice) or six periods (for real experiment).



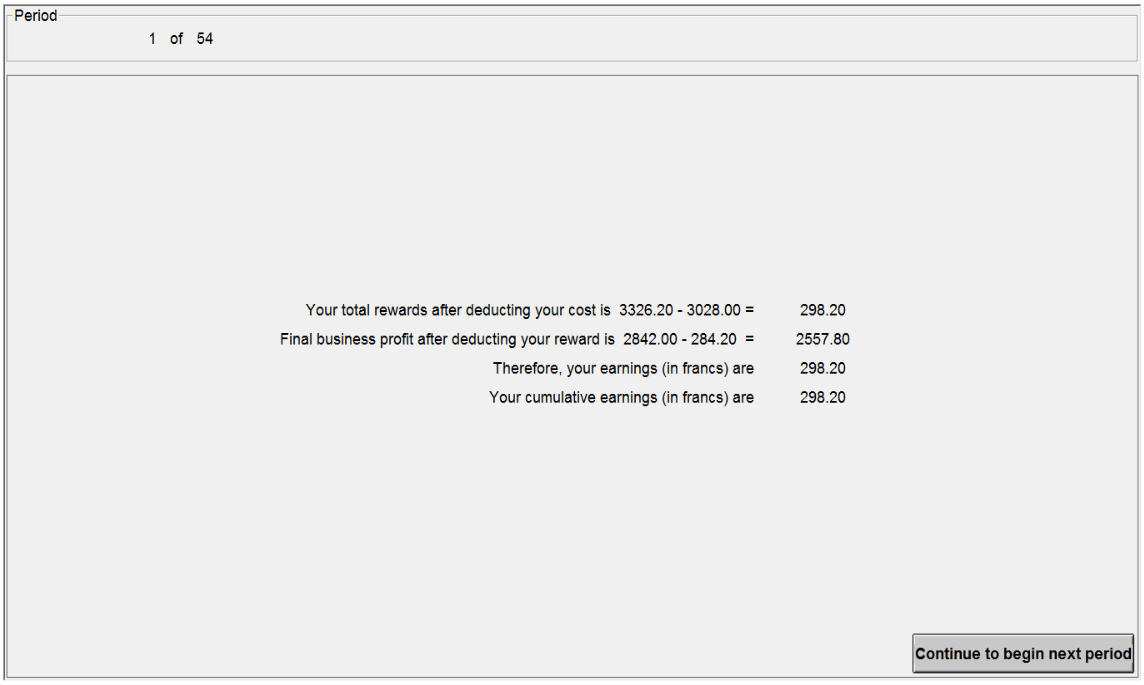
(k) Notification that the practice periods have ended and the real experiment will begin.



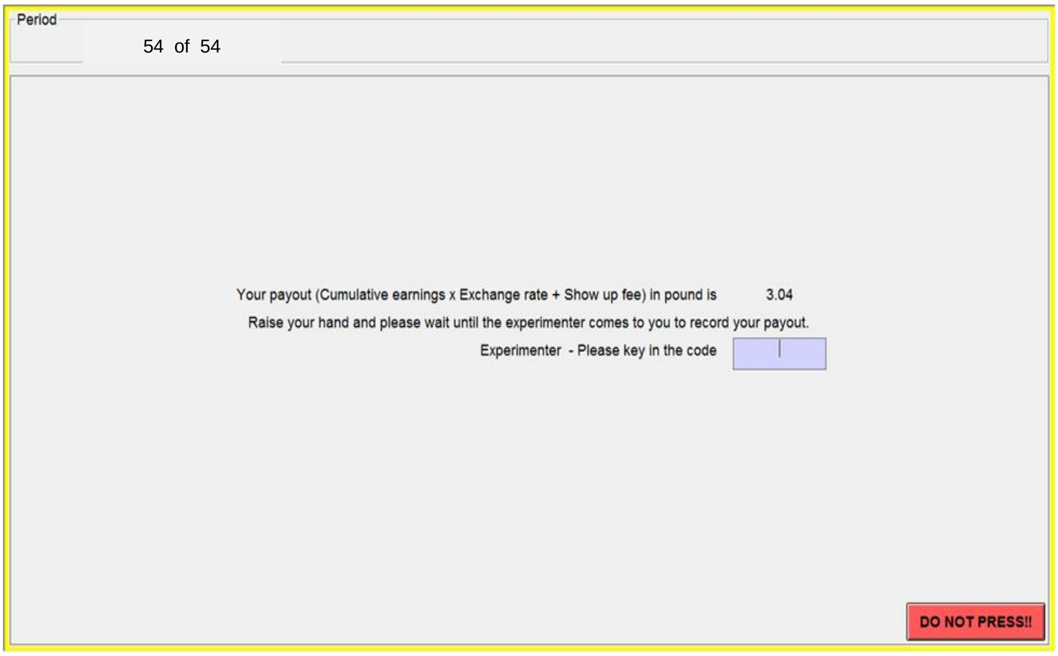
(l) Screenshot from the beginning of the real experiment.



The participant will start the real experiment from (c) till (i) for next consecutive six decision periods. The total number of decision periods will be 54. The participant's cumulative personal earnings will be shown each time the earnings for a decision periods are calculated as below.



(m) Screenshot the end of the experiment.



APPENDIX 9

Statement of earnings

<u>Statement of Earnings</u>

Print name: ………………………………………………………………………………..

Student ID on Smart Card: …………………………………………………………………..

Earnings: ……………………………………………………………………………………

Signature: …………………………………………………………………………………

Date: ………………………………………………………………………………………

Signature of Receipt: ……………………………………….

Date: ………………………………………………………..

****

<u>Statement of Earnings</u>

Print name: ………………………………………………………………………………..

Student ID on Smart Card: …………………………………………………………………..

Earnings: ……………………………………………………………………………………

Signature: …………………………………………………………………………………

Date: ………………………………………………………………………………………

Call at Room 200, Garden Block, Mill Hill Lane, Durham University Business School between 11 am and 2 pm on Wednesday 20th March 2019 to collect your earnings. Bring your student smart card.

APPENDIX 10

Analysis of Order Effects for Six-Period Averages

Key for Treatments: αmsF. Numbers in cells are p-values.

Six-Period Averages	Positions									
Treatments	1	2	3	4	5	6	7	8	9	F	K-W
1: LLLL											
n	-	-	0.598	0.248	0.812	0.511	0.124	0.069	0.239	0.161	0.280
e_u	-	-	0.460	0.074	0.121	0.034	0.878	0.120	0.012	0.211	**0.077**
k	-	-	**0.083**	**0.036**	0.905	**0.020**	0.929	0.185	**0.011**	**0.003**	**0.044**
2: HLLL											
n	-	0.237	0.737	0.341	0.674	0.343	-	0.155	0.181	**0.071**	0.325
e_u	-	0.109	0.476	0.212	0.722	0.961	-	0.798	0.583	0.113	0.797
k	-	0.105	0.853	**0.055**	0.218	0.457	-	0.752	0.410	**0.003**	0.292
3: LHLL											
n	-	0.513	0.269	0.367	0.928	0.814	0.725	0.092	0.806	0.445	0.334
e_u	-	0.791	0.876	0.388	0.879	0.573	0.554	0.220	0.670	0.140	0.497
k	-	0.602	0.168	0.408	0.406	0.178	0.788	0.465	0.956	0.337	0.125
4: LLHL											
n	-	0.420	0.734	0.393	0.673	**0.006**	-	0.607	0.901	**0.053**	0.403
e_u	-	0.191	0.072	0.084	0.426	0.653	-	0.070	0.388	0.420	0.466
k	-	0.219	0.852	0.861	0.254	0.372	-	0.868	0.340	0.178	0.358
5: LLLH											
n	-	0.165	0.754	0.788	-	-	0.591	0.631	0.885	0.244	0.105
e_u	-	0.554	0.310	0.105	-	-	**0.092**	0.309	0.307	**0.033**	0.264
k	-	0.787	0.251	**0.050**	-	-	**0.007**	**0.098**	0.286	**0.070**	**0.083**
6: HHLL											
n	-	0.165	0.925	0.864	0.665	0.223	0.497	0.643	0.816	0.242	0.530
e_u	-	0.895	0.585	0.663	0.257	0.611	0.190	0.775	0.917	**0.099**	0.780
k	-	0.521	0.658	0.698	0.299	0.289	0.326	0.724	0.961	0.186	0.750
7: HLHL											
n	-	0.294	0.729	0.827	0.045	0.837	-	0.217	0.612	0.691	0.779
e_u	-	0.025	0.168	0.346	0.031	0.741	-	0.008	0.042	0.510	0.427
k	-	0.048	0.030	0.135	0.095	0.792	-	0.003	0.064	0.330	0.453
8: LHHL											
n	-	0.995	0.153	0.164	0.028	0.011	-	0.002	0.023	0.101	**0.002**
e_u	-	0.449	0.981	0.477	0.306	0.146	-	0.028	0.042	0.236	0.326
k	-	0.653	0.336	0.621	0.457	0.322	-	0.052	0.050	0.222	0.563
9: HHHL											
n	-	0.318	0.509	0.788	0.414	0.299	0.930	0.439	0.360	**0.054**	0.195
e_u	-	0.242	0.431	0.313	0.653	0.060	0.035	0.183	0.117	0.400	0.678
k	-	0.106	0.187	0.338	0.611	0.275	0.060	0.352	0.188	0.594	0.745

There is a bold value in cells in which a p-value for the regression or Kruskal-Wallis (KW) statistic is 0.1 or less. In summary, we add interaction dummies to the main analysis: P5, P6, P8, P9 for n. Also, we add interaction dummies to the main analysis: P4, P6, P7, P9 and P3, P4 P6, P7, P8, P9 for e_u and k respectively.

APPENDIX 11

The coefficient estimates for the position and personal characteristics control variables for n, e_u, k as the dependent variable

	Dependent Variable = $\overline{n}$ (3-period)		*Dependent Variable = $\overline{n}$ (6-period)*	
Regressor	Estimated Coefficients	*p*-values (2-tailed)	Estimated Coefficients	*p*-values (2-tailed)
pt_n_a	17.625	0.03	-19.132	0.02
pt_n_b	10.533	0.06	8.335	0.11
pt_n_c	5.095	0.60	14.954	0.01
pt_n_d	8.568	0.14	23.932	0.00
pt_n_e	12.049	0.06	15.864	0.00
pt_n_f	22.469	0.01	-	-
pt_n_g	11.641	0.04	-	-
Business	10.693	0.01	12.637	0.00
English	12.995	0.00	17.043	0.00
Law	11.211	0.02	14.321	0.00
Sciences	10.184	0.03	11.383	0.01
Arts	11.282	0.05	13.995	0.01
Social science	17.752	0.02	19.306	0.01
Bac	15.260	0.00	13.350	0.00
Msc	16.779	0.00	14.574	0.00
Phd	14.204	0.01	12.280	0.01
Male	0.128	0.95	-0.188	0.92
Experience	-0.849	0.67	-1.002	0.59
Indonesia	-0.709	0.91	-4.080	0.51
Chinese	-7.236	0.24	-12.753	0.03
Malaysian	-2.162	0.74	-6.020	0.32
Indian	-6.599	0.35	-9.142	0.17

South Korean	4.977	0.55	2.586	0.74
Taiwan	10.084	0.26	6.616	0.43
Pakistani	3.856	0.66	-0.407	0.96
Turkish	-1.146	0.86	-4.577	0.47
Saudi Arabian	-17.662	0.04	-15.923	0.05
Cypriot	-40.742	0.00	-45.404	0.00
Nigerian	7.475	0.40	5.233	0.53
Bulgarian	-31.392	0.00	-39.648	0.00
Germany	-14.518	0.11	-16.711	0.05
Italian	6.625	0.46	3.397	0.68
British	-1.808	0.77	-6.731	0.25

	Dependent Variable = $\bar{e}_u$ *(3-period)*		*Dependent Variable* = $\bar{e}_u$ *(6-period)*	
Regressor	Estimated Coefficients	*p*-values (2-tailed)	Estimated Coefficients	*p*-values (2-tailed)
pt_eu_a	-	-	-4.247	0.332
pt_eu_b	-	-	-3.035	0.36
pt_eu_c	-	-	-6.417	0.13
pt_eu_d	-	-	-6.392	0.23
pt_eu_e	-	-	-	-
Business	-9.771	0.00	-10.496	0.00
English	-17.191	0.00	-17.096	0.00
Law	-14.190	0.00	-14.314	0.00
Sciences	-13.417	0.00	-13.978	0.00
Arts	4.937	0.26	1.929	0.63
Social science	-25.626	0.00	-27.462	0.00
Bac	-4.346	0.25	-2.412	0.48
Msc	-0.162	0.97	1.301	0.73
Phd	-0.130	0.98	1.098	0.77
Male	4.141	0.01	4.698	0.00
Experience	2.444	0.11	4.018	0.00
Indonesia	-18.207	0.00	-17.170	0.00
Chinese	-2.635	0.59	-3.195	0.46
Malaysian	-8.991	0.08	-7.581	0.10
Indian	-12.519	0.02	-12.605	0.01
South Korean	-18.215	0.01	-17.800	0.00
Taiwan	-22.616	0.00	-19.307	0.00
Pakistani	-19.209	0.01	-14.911	0.02
Turkish	-7.129	0.18	-7.308	0.12
Saudi Arabian	2.117	0.75	2.742	0.65
Cypriot	10.401	0.11	8.179	0.17
Nigerian	1.792	0.80	-1.225	0.85
Bulgarian	10.003	0.23	11.230	0.14
Germany	-4.401	0.53	-4.171	0.51
Italian	-27.246	0.00	-25.791	0.00
British	-11.843	0.01	-11.680	0.01

	Dependent Variable = $\bar{k}$ *(3-period)*		*Dependent Variable* = $\bar{k}$ *(6-period)*	
Regressor	Estimated Coefficients	*p*-values (2-tailed)	Estimated Coefficients	*p*-values (2-tailed)
pt_k_a	-0.045	0.42	0.134	0.19
pt_k_b	-0.039	0.36	-0.061	0.22
pt_k_c	-0.055	0.31	-0.066	0.08
pt_k_d	-0.095	0.05	-0.072	0.13
pt_k_e	-0.076	0.11	0.168	0.02
pt_k_f	-	-	-0.053	0.38
pt_k_g	-	-	-0.132	0.03
pt_k_h	-	-	-0.055	0.20
Business	-0.126	0.00	-0.125	0.00
English	-0.187	0.00	-0.172	0.00
Law	-0.124	0.01	-0.118	0.00
Sciences	-0.126	0.00	-0.097	0.01
Arts	0.087	0.09	0.070	0.11
Social science	-0.312	0.00	-0.335	0.00
Bac	-0.051	0.24	-0.040	0.29
Msc	-0.013	0.78	-0.004	0.92
Phd	-0.003	0.95	0.005	0.90
Male	0.038	0.03	0.051	0.00
Experience	0.016	0.36	0.008	0.60
Indonesia	-0.221	0.00	-0.174	0.00
Chinese	-0.082	0.14	-0.059	0.23
Malaysian	-0.135	0.02	-0.100	0.05
Indian	-0.182	0.00	-0.139	0.01
South Korean	-0.219	0.00	-0.205	0.00
Taiwan	-0.261	0.00	-0.162	0.02
Pakistani	-0.276	0.00	-0.233	0.00
Turkish	-0.156	0.01	-0.116	0.03
Saudi Arabian	-0.006	0.94	0.032	0.64
Cypriot	-0.008	0.92	-0.021	0.75
Nigerian	-0.039	0.63	0.007	0.92
Bulgarian	0.126	0.19	0.194	0.02
Germany	-0.110	0.17	-0.084	0.24
Italian	-0.289	0.00	-0.271	0.00
British	-0.172	0.00	-0.149	0.00

APPENDIX 12

The estimated regression for n, e_u, k as the dependent variable for 6-period

Dependent Variable = $\overline{n}$		
Regressor	Estimated Coefficients	*p*-values (2-tailed)
constant	65.522	0.00
α	6.724	0.01
m	-3.181	0.22
s	2.962	0.26
F	-0.226	0.93
$\alpha \times m$	4.511	0.21
$\alpha \times s$	-2.633	0.47
$m \times s$	-8.604	0.06
$\alpha \times m \times s$	8.205	0.16

Dependent Variable = $\overline{e}_u$		
Regressor	Estimated Coefficients	*p*-values (2-tailed)
constant	31.840	0.00
α	-0.339	0.90
m	0.492	0.85
s	7.461	0.00
F	-1.250	0.64
$\alpha \times m$	1.501	0.64
$\alpha \times s$	-2.214	0.50
$m \times s$	-0.024	0.99
$\alpha \times m \times s$	-0.626	0.88

Dependent Variable = $\bar{k}$		
Regressor	Estimated Coefficients	*p*-values (2-tailed)
constant	0.402	0.00
α	-0.080	0.01
m	0.029	0.33
s	0.052	0.08
f	0.006	0.86
$\alpha \times m$	0.024	0.52
$\alpha \times s$	0.006	0.86
$m \times s$	0.021	0.57
$\alpha \times m \times s$	-0.030	0.54

APPENDIX 13

Performance regressions for 6 period

	$W + x_P$	W	x_P	x_P/n	$\ln x_P$	$\ln x_P/n$	C
α	154.8 (0.531)	1445.0 (0.000)	-1290.2 (0.000)	-14.3 (0.057)	-1.154 (0.000)	-0.011 (0.662)	92.2 (0.446)
m	34.7 (0.887)	30.8 (0.787)	3.9 (0.983)	1.5 (0.835)	0.016 (0.913)	0.004 (0.873)	17.9 (0.881)
s	869.4 (0.000)	803.3 (0.000)	66.1 (0.725)	0.8 (0.915)	0.058 (0.693)	0.003 (0.896)	427.0 (0.000)
F	32.0 (0.902)	1047.1 (0.000)	-1015.1 (0.000)	-33.1 (0.000)	0.014 (0.929)	-0.085 (0.002)	12.1 (0.924)
$\alpha \times m$	217.6 (0.475)	39.4 (0.782)	178.3 (0.441)	0.9 (0.924)	0.142 (0.436)	-0.002 (0.954)	100.2 (0.502)
$\alpha \times s$	-309.3 (0.313)	-470.5 (0.001)	161.2 (0.488)	1.7 (0.859)	0.247 (0.178)	-0.001 (0.974)	-157.2 (0.295)
$m \times s$	-153.5 (0.669)	-199.6 (0.234)	46.1 (0.866)	1.3 (0.904)	0.024 (0.910)	0.000 (0.995)	-85.8 (0.626)
$\alpha \times m \times s$	57.8 (0.896)	234.4 (0.254)	-176.6 (0.598)	-3.1 (0.817)	-0.239 (0.364)	-0.002 (0.967)	41.9 (0.846)
$\overline{R}^2$	0.240	0.630	0.408	0.084	0.414	0.016	0.242
F-value	5.76 (0.000)	26.67 (0.000)	11.40 (0.000)	2.38 (0.000)	11.67 (0.000)	1.24 (0.133)	5.82 (0.000)

APPENDIX 14

Performance regressions for 6 period and 3 period without including T5 (LLLH)

3-period	$W + x_P$	W	x_P	x_P/n	$\ln x_P$	$\ln x_P/n$	C
α	382.7 (0.241)	1571.2 (0.000)	-1188.5 (0.000)	-14.6 (0.000)	-1.162 (0.000)	-0.014 (0.000)	201.8 (0.209)
m	-61.2 (0.841)	52.9 (0.696)	-114.1 (0.615)	-1.5 (0.531)	-0.007 (0.971)	-0.001 (0.540)	-32.9 (0.826)
s	1038.6 (0.001)	901.0 (0.000)	137.6 (0.544)	-0.2 (0.937)	0.090 (0.628)	-0.000 (0.956)	509.8 (0.001)
$\alpha \times m$	116.9 (0.764)	-49.6 (0.774)	166.5 (0.566)	2.4 (0.454)	0.103 (0.664)	0.002 (0.462)	55.1 (0.773)
$\alpha \times s$	-608.5 (0.118)	-619.3 (0.000)	10.9 (0.970)	1.4 (0.660)	0.195 (0.413)	0.001 (0.668)	-316.0 (0.099)
$m \times s$	-44.0 (0.922)	-165.0 (0.410)	120.9 (0.719)	2.8 (0.451)	0.007 (0.980)	0.003 (0.458)	-37.0 (0.867)
$\alpha \times m \times s$	50.1 (0.928)	232.6 (0.345)	-182.5 (0.659)	-3.5 (0.432)	-0.174 (0.607)	-0.003 (0.438)	52.3 (0.848)
$\overline{R}^2$	0.212	0.603	0.358	0.380	0.365	0.381	0.213
F-value	4.86 (0.000)	22.75 (0.000)	8.99 (0.000)	9.79 (0.000)	9.24 (0.000)	9.84 (0.000)	4.89 (0.000)

6-period	$W + x_P$	W	x_P	x_P/n	$\ln x_P$	$\ln x_P/n$	C
α	154.8 (0.546)	1443.2 (0.000)	-1288.4 (0.000)	-15.3 (0.000)	-1.153 (0.000)	-0.015 (0.000)	91.7 (0.465)
m	36.2 (0.887)	29.9 (0.800)	6.3 (0.974)	0.5 (0.798)	0.018 (0.909)	0.001 (0.798)	18.2 (0.884)
s	871.9 (0.001)	802.3 (0.000)	69.7 (0.718)	-0.2 (0.933)	0.060 (0.696)	-0.000 (0.953)	427.6 (0.001)
$\alpha \times m$	217.7 (0.491)	41.1 (0.780)	176.5 (0.458)	1.9 (0.466)	0.141 (0.460)	0.002 (0.464)	100.7 (0.515)
$\alpha \times s$	-310.2 (0.329)	-468.5 (0.002)	158.3 (0.508)	2.6 (0.314)	0.245 (0.202)	0.003 (0.316)	-157.1 (0.313)
$m \times s$	-153.1 (0.681)	-193.8 (0.265)	40.7 (0.885)	1.5 (0.621)	0.022 (0.923)	0.001 (0.621)	-84.7 (0.643)
$\alpha \times m \times s$	55.9 (0.903)	227.7 (0.285)	-171.9 (0.617)	-3.3 (0.379)	-0.237 (0.390)	-0.003 (0.377)	40.0 (0.858)
$\overline{R}^2$	0.230	0.641	0.399	0.424	0.405	0.425	0.231
F-value	5.37 (0.000)	27.23 (0.000)	10.74 (0.000)	11.79 (0.000)	10.98 (0.000)	11.85 (0.000)	5.40 (0.000)

BIBLIOGRAPHY

AAOIFI. (2015). Shariah Standards, Dar Al-Maiman, Riyadh.

Abdul Kader, Hala, Adams, M., Hardwick, P., & Kwon, W. J. (2014). Cost efficiency and board composition under different takaful insurance business models. *International Review of Financial Analysis*, *32*, 60–70.

Abdul Kader, Hale, Adams, M., & Hardwick, P. (2010). The cost efficiency of takaful insurance companies. *Geneva Papers on Risk and Insurance: Issues and Practice*, *35*(1), 161–181. https://doi.org/10.1057/gpp.2009.33

Abdul Shukor, S. (2020). Trust in takaful agents: antecedents and consequences. *Journal of Islamic Accounting and Business Research*, *11*(6), 1161–1174.

Abdul Wahab, A. R., Lewis, M. K., & Hassan, M. K. (2007). Islamic Takaful: Business models, Shariah concerns, and Proposed solutions. *Thunderbird International Business Review*, *49*(3), 371–396. https://doi.org/10.1002/tie.20148

Abu-Tapanjeh, A. M. (2009). Corporate governance from the Islamic perspective: A comparative analysis with OECD principles. *Critical Perspectives on Accounting*, *20*(5), 556–567. https://doi.org/10.1016/j.cpa.2007.12.004

Abu Kasim, N. A. (2012). Disclosure of Shariah Compliance by Malaysian Takaful Companies. *Journal of Islamic Accounting and Business Research*, *3*(1), 20–38. https://doi.org/10.1108/17590811211216041

Ahmed, M., & Khatun, M. (2013). *The Compliance with Shariah Governance System of AAOIFI: A Study on Islamic Banks Bangladesh*.

Akhter, W., Pappas, V., & Khan, S. U. (2017). A comparison of Islamic and conventional insurance demand: Worldwide evidence during the Global Financial Crisis. *Research in International Business and Finance*, *42*, 1401–1412.

Al-Amri, K. (2015). Takaful insurance efficiency in the GCC countries. *Humanomics*, *31*(3), 344–353.

Alkhan, A. M., & Hassan, M. K. (2020a). How do takaful operators choose which model to adopt? A case study from the Kingdom of Bahrain. *Journal of Islamic Accounting and Business Research*, *11*(9), 1677–1688.

Alkhan, A. M., & Hassan, M. K. (2020b). Takaful operators: Analysing segregated accounts between operator/participants. *Journal of Islamic Accounting and Business Research*.

Alsaadi, A., Ebrahim, M. S., & Jaafar, A. (2017). Corporate Social Responsibility, Shariah-Compliance, and Earnings Quality. *Journal of Financial Services Research*, *51*(2), 169–194. https://doi.org/10.1007/s10693-016-0263-0

Alshammari, A. A., Syed Jaafar Alhabshi, S. M., & Saiti, B. (2018). The impact of competition on cost efficiency of insurance and takaful sectors: Evidence from GCC markets based on the Stochastic Frontier Analysis. *Research in International Business and Finance*, 1–29.

Ang, S.H. (2014), *Research Design for Business and Management*. London: Sage.

Ariff, M., & Iqbal, M. (2011). *The Foundations of Islamic Banking: Theory, Practice and Education*. Edward Elgar Publishing Limited, United Kingdom.

Asafa, D. A., & Archer, S. (2018). *Issues Arising From Changes in Takaful Capital Requirements*. Islamic Financial Services Board, IFSB-WP-08.

Asaria, I. (2013). Innovations and Developments in Takaful and Re-takaful. *NewHorizon*, 31–33.

Baharin, R., & Isa, Z. (2013). The efficiency of life insurance and family Takaful in Malaysia: Relative efficiency using the stochastic cost frontier analysis. *AIP Conference Proceedings*, 1098–1104.

Berg, J. E., Daley, L. A., Dickhaut, J. W., & O'brien, J. R. (1986). Controlling Preferences for Lotteries on Units of Experimental Exchange. *The Quarterly Journal of Economics*, *101*(2), 281–306. https://academic.oup.com/qje/article-abstract/101/2/281/1928662

Bhatti, M., & Bhatti, M. I. (2010). Toward Understanding Islamic Corporate Governance Issues in Islamic Finance. *Asian Politics & Policy*, *2*(1), 25–38.

Billah, M. (1998). Islamic Insurance: its origins and development. *Arab Law Quarterly*, *13*, 386–422.

Brandts, J., & Charness, G. (2004). Do Labour Market Conditions Affect Gift Exchange? Some Experimental Evidence. *The Economic Journal*, *114*(497), 684–708.

Brüggen, A., & Moers, F. (2007). The Role of Financial Incentives and Social Incentives in Multi-task Settings. *Journal of Management Accounting Research*, *19*(1), 25–50.

Bryman, A. (2004), Social Research Methods. New York, NY: Oxford University Press Inc.

Burns, P. (1985). Experience and Decision Making: A Comparison of Students and Businessmen in a Simulated Progressive Auction. In *Research in Experimental Economics (Smith, V. L)* (Vol. 3, pp. 139–157). JAI Press, Greenwich, Connecticut.

Chapra, M. U., & Ahmed, H. (2002). *Corporate Governance in Islamic Financial*

Institutions. Islamic Development Bank (Occasional Paper No. 6).

Christensen, P. O., & Feltham, G. (2008a). *Economics of Accounting: Performance Evaluation: Vol. II*. Springer, New York.

Christensen, P. O., & Feltham, G. A. (2008b). *Economics of Accounting: Performance Evaluation: Vol. II*. Springer, New York.

Coolen-Maturi, T. (2013). Islamic insurance (takaful): demand and supply in the UK. *International Journal of Islamic and Middle Eastern Finance and Management*, *6*, 87–104.

Cooper, D. R., & Schindler, P. S. (2008). *Business Research Methods* (10th Ed). McGraw-Hill Singapore.

Core, J. E., Holthausen, R. W., & Larcker, D. F. (1999). Corporate Governance, Chief Executive Officer Compensation, and Firm Performance. *Journal of Financial Economics*, *51*(3), 371–406.

Crotty, M. (2004), *The Foundations of Social Research: Meaning and Perspective in the Research Process*. London: Sage. (ML)

Davis, D. D., & Holt, C. A. (1993). Experimental Economics: Methods, Problems, and Promise. *Estudios Economicos*, *8*(2 (16)), 179–212. http://about.jstor.org/terms

Davis, S., DeZoort, F. T., & Kopp, L. S. (2006). The Effect of Obedience Pressure and Perceived Responsibility on Management Accountants' Creation of Budgetary Slack. *Behavioral Research in Accounting*, *18*(1), 19–35.

Dobbs, I. M., & Miller, A. D. (2009). Experimental Evidence on Financial Incentives, Information and Decision-making. *The British Accounting Review*, *41*(2), 71–89.

Dobbs, I. M., & Miller, A. D. (2014). Inducing Risk Preferences in Multi-stage Multi-agent Laboratory Experiments. *Applied Economics*, *46*(16), 1924–1939. https://doi.org/10.1080/00036846.2014.889801

Fehr, E., Kirchler, E., Weichbold, A., & Gächter, S. (1998). When Social Norms Overpower Competition: Gift Exchange in Experimental Labor Markets. *Journal of Labor Economics*, *16*(2), 324–351.

Fischbacher, U. (2007). Z-Tree: Zurich Toolbox for Ready-made Economic Experiments. *Experimental Economics*, *10*(2), 171–178. https://doi.org/10.1007/s10683-006-9159-4

Finance Forward. (2016). *World Takaful Report 2016: Connecting the dots, Forging the future.* http://meglobaladvisors.com/insights/

Gonulal, S. O. (2012). *Takaful and Mutual Insurance: Alternative Approaches to*

Managing Risks. World Bank.

Grais, W., & Pellegrini, M. (2006). *Corporate Governance in Institutions Offering Islamic Financial Services Issues and Options*. http://econ.worldbank.org.wps4052

Grant, B. M., & Giddings, L. S. (2002). Making sense of methodologies: A paradigm framework for the novice researcher. *Contemporary Nurse*, *13*(1), 10–28.

Holden, M. T., & Lynch, P. (2004). Choosing the appropriate methodology: Understanding research philosophy. *The Marketing Review*, *4*, 397–409.

Hull, J. C. (2012). *Options, Futures, and Other Derivatives* (8th ed.). Pearson, Harlow.

Hunt-Ahmed, K. (2013). *Contemporary Islamic Finance: Innovations, Applications, and Best Practices*. John Wiley & Sons, Inc, New Jersey.

IFSB-11. (2010). *Standard On Solvency Requirements For Takāful (Islamic Insurance) Undertakings*. Islamic Financial Services Board, Kuala Lumpur.

IFSB-14. (2013). *Standard on Risk Management for Takaful (Islamic insurance) Undertakings*. Islamic Financial Services Board.

IFSB-8. (2009). *Guiding Principles on Governance for Takaful (Islamic Insurance) Undertakings*. Islamic Financial Services Board, Kuala Lumpur.

IFSB. (2017). *Realising The Value Proposition Of The Takaful Industry For A Stable And Inclusive Financial System*. Islamic Financial Services Board and The World Bank.

IFSB. (2021). *Islamic Financial Services Industry Stability Report 2021*.

ISRA. (2012). Islamic Financial System: Principles & Operations. In *International Shari'ah Research Academy for Islamic Finance (ISRA)*. Pearson, Malaysia.

Jensen, M. C., & Meckling, W. H. (1976). Theory of The Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics*, *3*(4), 305–360.

Johnston, J. (1984). *Econometric Methods* (3rd ed.). McGraw-Hill, Auckland.

Kamil, N. M., & Mat Nor, N. B. (2014). Factors influencing the choice of takaful over conventional insurance: The case of Malaysia. *Journal of Islamic Finance*, *3*(2), 1–14.

Karbhari, Y., Muye, I., Hassan, A. F. S., & Elnahass, M. (2018). Governance mechanisms and efficiency: Evidence from an alternative insurance (Takaful) market. *Journal of International Financial Markets, Institutions and Money*, *56*, 71–92.

Kelman, H. C. (1967). Human Use of Human Subjects: The Problem of Deception in

Social Psychological Experiments. *Psychological Bulletin*, *67*(1), 1–11.

Khan, A., Hassan, M. K., Paltrinieri, A., Dreassi, A., & Bahoo, S. (2020). A Bibliometric Review of Takaful Literature. *International Review of Economics and Finance*, *69*(June), 389–405. https://doi.org/10.1016/j.iref.2020.05.013

Khan, H. (2015a). Optimal Incentives for Takaful (Islamic Insurance) Operators. *Journal of Economic Behavior and Organization*, *109*, 135–144. https://doi.org/10.1016/j.jebo.2014.11.001

Khan, H. (2015b). Gift Exchange Anomaly: Evidence from Incentives vis-à-vis Performance of Islamic Insurance Operators. *Applied Economics Letters*, *22*(14), 1175–1178. https://doi.org/10.1080/13504851.2015.1016202

Khan, H. (2019a). A Nontechnical Guide on Optimal Incentives for Islamic Insurance Operators. *Journal of Risk and Financial Management*, *12*(3), 127. https://doi.org/10.3390/jrfm12030127

Khan, H. (2019b). A Nontechnical Guide on Optimal Incentives for Islamic Insurance Operators. *Journal of Risk and Financial Management*, *12*(3), 1–14. https://doi.org/10.3390/jrfm12030127

Kuang, X. J., & Moser, D. V. (2009). Reciprocity and the Effectiveness of Optimal Agency Contracts. *Accounting Review*, *84*(5), 1671–1694. https://doi.org/10.2308/accr.2009.84.5.1671

Kwon, W. J. (2007). Islamic principle and Takaful insurance: Re-evaluation. *Journal of Insurance Regulation*, *26*, 53–81.

Masud, H. (2011). Takaful: an innovative approach to insurance and Islamic Finance. *University of Pennsylvania Journal of International Law*, *32*, 1132–1164.

Mokhtar, H. S. A., Aziz, I. A., & Hilal, N. M. (2015). Surplus-sharing Practices of Takaful Operators in Malaysia. *ISRA International Journal of Islamic Finance*, *7*(1), 99–126.

Myers, S. C. (1977). Determinants of Corporate Borrowing. *Journal of Financial Economics*, *5*(2), 147–175.

Okeahalam, C. C. (1998). The Political Economy of Bank Failure and Supervision in the Republic of South Africa. *African Association of Political Science*, *3*(2), 29–48.

Orne, M. T., & Holland, C. H. (1968). On the Ecological Validity of Laboratory Deceptions. *International Journal of Psychiatry*, *6*(4), 282–293.

Palfrey, T., & Porter, R. (1991). Guidelines for Submission of Manuscripts on Experimental Economics. *Econometrica*, *59*(4), 1197–1198.

Parker, F. (2012). *FNB Sharia Banking Credentials Questioned As Board Quits*. Mail &

Guardian. https://mg.co.za/article/2012-07-09-fnb-islamic-finance-unit/

Plott, C. R. (1991). Will Economics Become an Experimental Science? *Southern Economic Journal*, *57*(4), 901–919. http://about.jstor.org/terms

Riecken, H. W. (1962). A Program for Research on Experiments in Social Psychology. *Decisions, Values and Groups*, *2*(Proceedings of a conference held at the University of New Mexico, Pergamon, Oxford), 25–41.

Rosenthal, R. (1963). On the Social Psychology of the Psychological Experiment: 1, 2 the Experimenter's Hypothesis as Unintended Determinant of Experimental Results. *American Scientist*, *51*(2), 268–283.

Rosenthal, R., & Fode, K. L. (1963). The Effect of Experimenter Bias on the Performance of the Albino Rat. *Behavioral Science*, *8*(3), 183–189.

Rosly, S. A. (2005). *Critical Issues on Islamic Banking and Financial Markets: Islamic Economics, Banking and Finance, Investments, Takaful and Financial Planning*. United States of America, Bloomington, Indiana: AuthorHouse.

Roth, A. E. (1987). Laboratory Experimentation in Economics. In T. F. Bewley (Ed.), *Advances in Economic Theory Fifth World Congress* (pp. 269–299). Cambridge University Press, Cambridge.

Roth, A. E. (1988). Laboratory Experimentation in Economics: A Methodological Overview. *The Economic Journal*, *98*(393), 974–1031.

Roth, A. E. (1994). Lets Keep the Con out of Experimental Econ.: A Methodological Note. *Empirical Economics*, *19*, 279–289.

Ryan, G. S. (2018). Introduction to positivism, interpretivism and critical theory. *Nurse Researcher*, *25*(4), 14–20.

Safieddine, A. (2009). Islamic Financial Institutions and Corporate Governance: New Insights for Agency Theory. *Corporate Governance: An International Review*, *17*(2), 142–158. https://doi.org/10.1111/j.1467-8683.2009.00729.x

Sherif, M., & Ahmed, S. (2017). Family Takaful in developing countries: the case of Middle East and North Africa (MENA). *International Journal of Islamic and Middle Eastern Finance and Management*, 1–39.

Sherif, M., & Shaairi, N. A. (2013). Determinants of demand on family Takaful in Malaysia. *Journal of Islamic Accounting and Business Research*, *4*(1), 26–50.

Smith, V. L. (1976). Experimental Economics: Induced Value Theory. *The American Economic Review*, *66*(22 (Papers and Proceedings of the Eighty-eighth Annual Meeting of the American Economic Association)), 274–279.

http://about.jstor.org/terms

Smith, V. L., Suchanek, G. L., & Williams, A. W. (1988). Bubbles, Crashes, and Endogenous Expectations in Experimental Spot Asset Markets. *Econometrica: Journal of the Econometric Society*, *56*(5), 1119–1151.

Sprinkle, G. B. (2000). The Effect of Incentive Contracts on Learning and Performance. *The Accounting Review*, *75*(3), 299–326.

Sprinkle, G. B. (2003). Perspectives on Experimental Research in Managerial Accounting. *Accounting, Organizations and Society*, *28*(2), 287–318.

Tirole, J. (2006). Corporate Governance. In *The Theory of Corporate Governance* (pp. 15–73). Princeton University Press, Princeton, New Jersey.

Ustaoğlu, M. (2014). Public awareness, understanding and attitudes towards interest-free insurance (Takaful) services evaluation by education level: Survey based on empirical analysis for Turkey. *Journal of Asian and African Studies*, 1–12.

Watch, S. F. (2012). *Help Wanted: Shariah Scholars Needed for South African Shariah-Compliant Bank (The Previous Board Left in a Hurry)*. Shariah Finance Watch. https://shariahfinancewatch.org/2012/08/31/help-wanted-shariah-scholars-needed-for-south-african-shariah-compliant-bank-the-previous-board-left-in-a-hurry/

Wilson, R. (2000). Challenges and Opportunities for Islamic Banking and Finance in the West: The United Kingdom Experience. *Islamic Economic Studies*, *7*(1 & 2), 35–59.

Zubaida, S. (1990). The Politics of the Islamic Investment Companies in Egypt. *Bulletin (British Society for Middle Eastern Studies*, *17*(2), 152–161. https://about.jstor.org/terms