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INCENTIVE-COMPATIBLE *SUKŪK MUSHĀRAKAH* FOR PRIVATE SECTOR FUNDING

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Abstract

Despite the huge potential on both the demand and supply sides of the ṣukūk market, the current ṣukūk structures fall short of adequately meeting the market's needs as the Sharī'ah compliance of many of them and/or their economic efficiency are questionable. Even though partnership-based ṣukūk are claimed to reflect the true spirit of Islamic finance, their underuse as a financing instrument is a notable fact. Such a situation, if not addressed, will impede the development of the ṣukūk market in the future. This paper proposes an innovative ṣukūk mushārakah model for consideration by companies and revenue generating infrastructure projects. The model has an incentive-compatible feature by making the share of the issuing entity in the profit positively related to its performance in addition to a convertibility clause. The sector Return on Equity (ROE), adjusted with the firm beta, is considered a benchmark for measuring the performance of the firm. The paper examines the design of the model, its risk return profile as well as its pricing for secondary market trading. The theoretical properties of the model are empirically validated through two types of simulations: Monte Carlo Simulation and backtesting. The proposed model constitutes a new class of financial security with respect to the residual nature of the claim and its limited tenor. It, thus, presents an opportunity for diversification. The model implies higher risk for the investor, as

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neither the profit nor the capital is guaranteed–like common stock–but the return is expected to be higher. The model would entail higher financial cost for companies–as compared to debt instruments–but it would imply at the same time lower probability of bankruptcy, since the ṣukūk are equity-based instruments.

Keywords: *Ṣukūk mushārakah*, Monte Carlo Simulation, Backtesting, Risk-return, Incentive-compatible.

I. INTRODUCTION

On both the demand and supply sides of the *ṣukūk* market, the potential is high. On the demand side, there is an increasing amount of wealth accumulated in the hands of Muslim investors, particularly in the oil-rich Gulf countries, who are looking for investment vehicles that are in conformity with the rules of the Sharī'ah. The wealth in the hands of Middle Eastern High Net Worth Individuals (HNWI) alone was estimated at US$ 1.5 trillion in 2009 (GIFF, 2010: 32). Besides this category of investors, there are others who consider *ṣukūk* suitable instruments for ethical investment and diversification. The oversubscription of many *ṣukūk* issues provides additional testimony of the huge demand for this type of investment.

On the supply side, there are a number of infrastructure projects in Muslim countries that require huge amounts of funds. The planned infrastructure projects in the Gulf Cooperation Council (GCC) countries alone, from 2008 to 2013, amount to US$ 2 trillion (GIFF, 2010: 31). A large number of the infrastructure projects in this region have been financed through *ṣukūk* issuance. Moreover, the recent crisis in the credit market gave many conventional governments and corporations additional reasons to diversify their sources of funding. This helps explain the increasing openness of many non-Muslim countries to Islamic finance. Also, Islamic financial institutions, which usually use the short-term funds on their liability side to finance their long-term assets, are in need of *ṣukūk* to manage this maturity mismatch (Standard & Poor, 2009).

Over the last decade, *ṣukūk* (sing. *ṣakk*) have been seen as an alternative to interest-based financing in the Islamic capital market. *Ṣukūk* represent proportionate beneficial ownership of an asset or a pool of assets for a defined period when the risk and return associated with the cash flows generated by the underlying assets

are passed to the *ṣukūk*-holders (Iqbal and Mirakhor 2007: 177). However, the euphoria that accompanied the phenomenal growth of the *ṣukūk* market has been tarnished by various criticisms raised about the Sharīʿah compliance and/or the economic efficiency of many of the current *ṣukūk* structures. Those criticisms culminated with the famous statement of Shaykh Taqi Usmani in 2007, declaring that 85% of the equity-based *ṣukūk* structures (i.e. *mudhārabah*/*mushārakah ṣukūk*) at that period were not Sharīʿah compliant. As a consequence the issuance of equity-based *ṣukūk* drastically dropped in the subsequent years (IIFM, 2009). Given the prominent place that these equity-based contracts are expected to play in Islamic finance, their underutilization would constitute a clear impediment to the development of the industry. The objective of this paper is, therefore, to propose an innovative model of *ṣukūk mushārakah* for companies and revenue generating infrastructure projects that would overcome some of the issues found in the partnership-based contracts.

Section II reviews the literature pertaining to the potentials of *ṣukūk* for the private sector and some of the relevant issues. We are of the view that some of the issues identified in the literature can be addressed using a number of pertinent ideas from conventional finance. Thus, the literature on convertible bonds will be revisited. Section III is concerned with the design, the pricing, and the Sharīʿah assessment of the proposed *ṣukūk mushārakah* model. The theoretical characteristics of this model of *ṣukūk* will be tested empirically using two types of simulations: Monte Carlo Simulation and backtesting method in Section IV. Section V concludes the paper.

II. LITERATURE REVIEW

The principal message of this section is to point out the potentials of *ṣukūk* as a financing instrument for the private sector and to discuss the issues that could impede their realization. We have argued that to address these issues and take full advantage of the potential benefits we need to be innovative. Wisdom can be taken from anywhere, and conventional finance has some good aspects that would be useful to Islamic finance. In this regard, the concept of incentive-compatible contracts and, particularly, convertible bonds are explored. This concept presents opportunities for boosting the use of partnership contracts as a financing instrument in Islamic finance by addressing the potential agency problem found in them.

A. Ṣukūk: Potential for the Private Sector, and the Issues Involved

Even though numerous and various issues have been identified in the *ṣukūk* market, we shall limit the review to those issues that are directly related to equity-based *ṣukūk*. Thus, we shall not discuss issues pertaining to the benchmarking of *ṣukūk*, and their tradability, as they are addressed in a separate paper. On the other hand, the discussion in this paper does not refer to any particular jurisdiction. Therefore, the legal and regulatory issues will not be examined, as they may vary from one jurisdiction to another.

i. Potentials of Ṣukūk for the Private Sector

Nisar (2007) identified three common uses of *ṣukūk*: project-specific, asset-specific, and balance sheet-specific. For the first two, funds can be raised by selling the ownership rights of a project or an existing asset to a group of investors who will be entitled to the cash flow thereof during a specified period. On the other hand, the potential of *ṣukūk* for liquidity and balance sheet management has drawn the attention of many authors. It is argued that, with a dynamic secondary market, the Islamic financial institutions (IFIs) could dispose of excess liquidity by purchasing *ṣukūk*; conversely, they could sell the *ṣukūk* when liquidity is needed. Furthermore, *ṣukūk* could ease out some of the gross asset/liability mismatches found in the balance sheets of most Islamic banks, since with *ṣukūk* it is possible to create immediate funding and use long-term assets to back it (Adam, 2005).

ii. Selected Issues in the Ṣukūk Market

Oh, Hwang and Heshmati (2009) discussed two forms of product efficiency: technical efficiency and allocative efficiency. In the price-quality space, a product is technically efficient if it has higher quality for lower price. However, an efficient product may not be selected by consumers, even when it has the highest quality and lowest price. The reason is not the absolute level of quality, but a mix of qualities that does not match the consumer's preference structure. The allocative efficiency refers to the degree of match of quality mix with the preference structure. Adopting these definitions and applying them to financial products, we can say that the *ṣukūk* product is technically efficient if it provides higher returns compared to other financial instruments with the same level of risk. Furthermore, we consider that tradability in addition to Sharīʿah compliance are essential constituents of allocative efficiency in the *ṣukūk* market.

Haneef (2009) identified three hallmarks in the development of the *ṣukūk* market. He showed that *ṣukūk* evolved from an asset-backed model, in which the *ṣukūk*-holders have ownership rights over the underlying asset as per the Sharīʿah requirements, to an asset-based model. With the latter model, the *ṣukūk*-holders rank *pari passu* with unsecured creditors. Indeed, for all international bonds there is a negative pledge that restricts the borrowing entity from issuing any bond in the future that is not in *pari passu* with existing unsecured bonds. The third stage of the *ṣukūk* structures evolution was marked by the emergence of models that were mainly based on partnership contracts but which violate some of their basic Sharīʿah requirements. Those structures in particular have drawn various criticisms that culminated with Shaykh Taqi Usmani's declaration that 85% of those *ṣukūk* are Sharīʿah non-compliant. This led to the Accounting and Auditing Organisation for Islamic Financial Institutions' (AAOIFI) statement in 2008.

To raise funds through *ṣukūk,* companies may use either sale-based *ṣukūk,* lease-based *ṣukūk* or partnership-based *ṣukūk* (e.g. *muḍārabah* and *mushārakah*). The non-tradability of sale-based *ṣukūk* makes them unattractive to investors, as it drastically constraints their ability to exit the market when needed.[1] The *ijārah* (lease-based) structure can be used by companies to acquire new asset; they can also use it by selling, leasing and buying-back some of their fixed assets. However, the latter variant of *ijārah* has come under attack from different Muslim scholars who consider the structure as mere legal trick (*ḥīlah)* to circumvent the prohibition of borrowing on interest basis, as the combined contracts are just means for that end. Al-Amine (2008) analysed the structure of many of these combined contracts in the light of *bayʿ al-wafāʾ*[2], *bayʿ al-istighlāl*[3] and *bayʿ al-ʿīnah.*[4] It is found that all these transactions are controversial and accepted by only a minority of Muslim jurists. Those who reject them consider these types of transaction as mere legal tricks whose form

1 Within the Malaysian jurisdiction, sale-based *sukūk* are tradable since Malaysian scholars allow the sale of debt (*bai' al-dayn*) which is not allowed in other jurisdictions.

2 A transaction of sale of an estate with the condition that, in the future, the seller returns the cash and the buyer returns the estate.

3 It is a sale of real estate with the condition that the seller will lease out the estate and whenever he pays back the (same) price, he gets back his estate.

4 A contract which consists of a sale and buy-back. The price in one of the two transactions is paid cash while it is deferred for the other.

may adhere to the requirements of the Sharīʿah in exchange contracts, while the substance does not (Al-Zuhayli, 2003; Al-Amine, 2008). In the same vein, Ali (2008) held that the combined contracts in the *ṣukūk* structures attempt to replicate conventional financial products while trying to remain within Sharīʿah bounds. The end result is complicated products that are hard to understand, costly to construct and implement and which may contradict the objectives of Sharīʿah.

It can be argued that the complexity of a structure increases costs stemming from the need for more sophisticated legal documentation and more efforts for advertisement of the new product; as a result, the *ṣukūk* become less profitable, either for the investors or the issuers, or for both, which means a loss of efficiency in the technical sense.

Furthermore, Siddiqi (2006) is of the view that, to ensure justice and fairness, the returns to *ṣukūk* should be linked to the actual productivity of the underlying asset.[5] The rationale is that fairness requires that uncertainties attending upon productive enterprise be shared. At the same time, justice and fairness require that losses, if and when they occur due to the uncertainties in the business environment, should be borne by those who claim the profits when there are profits.

Partnership-based *ṣukūk* are potentially suitable to overcome the shortcomings of the two other types of structures mentioned above. Many Islamic economists see them as the most suitable financial instruments for the productive activities. However, financing products based on the concept of *muḍārabah/mushārakah* have never been popular in the industry. Obiyatulla (1997) has shown that *muḍārabah* financing has serious agency problems, lacks the bonding effect of debt financing, and can induce perverse incentives. He remarks that *muḍārabah* has the features of both equity (the claim is residual) and debt (the maturity is fixed). In addition, the *rabb al-māl* does not have the right to interfere in the business though he will bear the capital loss if it is not due to negligence.[6] As a result, *muḍārabah* has the agency problem of both equity and debt, which can take the form of misreporting, misallocating costs and taking on overly risky projects. Other writers, while acknowledging the agency problem in *muḍārabah*, invoke additional factors related to attitudes and structures. Thus,

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5 Examples of such cases are *sukūk intifāʿ* for the realization of Zam Zam Tower in Makkah and the Mushārakah Term Finance Certificates issued by a Pakistani conglomerate, Sitara Group.

6 This is the view of the majority of classical jurists. However, the Ḥanbalīs allow the *rabb al-māl* to participate in managerial decisions along with the *muḍārib* (See Kahf, 1997: 17).

for the development of *muḍārabah* financing the current negative attitude of the Islamic bankers towards risk and long-term investment needs to be adjusted. Similarly, the structure of the institutions that are called upon to undertake *muḍārabah* financing should also be adjusted to accommodate its specificities (Hasan, 2002).

Besides these economic issues, some scholars have pointed out other problems pertaining to the *fiqh* (i.e. Islamic law) aspects of the equity-based structures. Al-Amine (2008) pointed out the controversy among Muslim scholars over the permissibility of one of the *mushārakah* partners giving an undertaking to purchase the shares or units of other partners at a predetermined price. The rationale for the objection is that the very nature of *mushārakah* is the sharing of profit and loss among the partners. The undertaking to purchase the share of a partner at a predetermined price defeats that spirit of *mushārakah*, as one partner will have a guaranteed return, whatsoever the outcome of the venture.

Another issue which has drawn the attention of the scholars is the third party guarantee present in many *ṣukūk* structures. Al-Amine (2008) argues that theoretically, a benevolent third party guarantee without fee or consideration can be acceptable in Islamic law. However, in practice guaranteeing the principal of *ṣukūk* is problematic. This is due to the fact that if the guarantee is provided by a government it shall be declared non-permissible to use the property of the whole community for the benefit of private entities. Likewise, it is hardly conceivable for a private entity to provide a benevolent guarantee to another entity without a consideration.

An analysis of all these issues shows that the incongruence observed in the *ṣukūk* structures emanates from the desire to reconcile two different paradigms in financing. In the conventional setting, traditional debt financing allows the issuer to get funds without getting rid of some of its assets. On the other side, the investors get tradable securities whose return is determined ex ante. With the prohibition of interest in the Islamic framework, this form of financing (bonds) is not acceptable. Instead, methods endorsed by Sharīʿah entail either a profit-and-loss sharing scheme or transfer of an asset with all the rights and obligations. The incongruity arises when the Sharīʿah contracts are combined to reproduce the substance of a financial instrument that is repugnant to their nature and to the Islamic paradigm in finance. The literature that we have examined unveils that most of the innovation in the *ṣukūk* market has been more legal than financial; i.e., the forms and the legal documentations of the *ṣukūk* may be different from the existing instruments; however,

they are very much like the conventional debt instruments in terms of cash flow and risk return profile.

Thus, as we have seen above, *ṣukūk* offer numerous potential benefits. However, these potential benefits could be hampered by the increasing controversies over the Sharīʿah compliance of many of the *ṣukūk* structures in the market. These controversies negatively affect the allocative efficiency of *ṣukūk* in the long term, as many pious Muslim investors would prefer to put their funds in other investment vehicles. A result of such a move would be a reduced investor base for *ṣukūk* that leads to higher required rate of return for the funds suppliers or higher cost of capital for issuers, translating into less efficiency in the technical sense. The above review points to a lack of adequate instruments in the corporate *ṣukūk* market to make the supply of *ṣukūk* meet the potentially high demand for them. Therefore, for sustainable growth, we argue that financial innovation is necessary, as is advocated by many Muslim economists who consider financial engineering a vital area for Islamic finance (See for instance, Obaidullah, 2005; Al-Suwailem, 2006; Iqbal and Mirakhor, 2007). In the next paragraphs we review selected literature pertaining to incentive-compatible contracts and convertible bonds, concepts that are of relevance to Islamic finance, as they share some common features with it.

B. Dealing with the Agency Problem: The Examples of Incentive-Compatible Contracts and Convertible Bonds

Quite a lot of work dealing with the agency problem in financial markets can be found in the finance literature. The agency problem is a consequence of possible opportunistic behavior by an agent once the contract in a transaction has been concluded but the actions of the agent are unverifiable[7] and the contract does not cover all possible contingencies. The agency problem may arise with the inherent incompatibility between the most common security types, namely common stocks and bonds. Stockholders can be considered risk takers. With the concept of limited liability they are entitled to unlimited potential gain while the most they may lose is their equity fund. On the other hand, debt holders can be seen as risk-averse investors. The most they can gain is the principal plus a fixed return. In the case of

7 In the context of information asymmetry.

the firm's default, if the realized cash flow of the firm is less than the principal, debt holders receive any cash flow from the firm. If the realized cash flow of the firm is greater than the principal, debt holders receive the principal plus interest and do not participate in any gains above that value. Because of this incompatibility, the managers who are supposed to serve the best interest of the shareholders may engage in risky investments that could increase the firm's profitability but at the same time make the firm more vulnerable to financial distress (Loncarski, et al. 2006; Bancel and Mittoo, 2004).

The discussion in the conventional literature is based on debt and equity instruments. However, in the context of this study, the proposed *ṣukūk,* based on *mushārakah,* are not a debt instrument per se, though they have some of its features (e.g., the contract has a fixed maturity). Hence, the problem has a different form, as the claim of the *sukūk*-holders is residual and the maturity is fixed. Thus, the issuing company of *ṣukūk mushārakah* may misreport or may undertake projects with low returns in the initial stage and higher return in the later stage. With that scenario the *ṣukūk*-holders will be facing the same risk as the shareholders but will not enjoy the potential benefits of the projects which will accrue when the *ṣukūk* have expired. Furthermore, the company may misallocate the costs or misreport the profit that it realized. Incentive-compatible contracts may help mitigate the above form of agency problem.

Incentive-compatible contracts are thus devised to induce the agent to behave in the desired way. Some Islamic economists attempted to address the agency problem in *muḍārabah* through a variable profit-sharing ratio. Ahmad (2002) and Hasan (2002), each using different variables, derived a profit-sharing ratio which is positively related to the performance of the *muḍārib*. Both Hasan (2002) and Ahmad (2002) discussed the issue in the context of bank financing. The model proposed in this paper is discussed in the context of the capital market, and the variables considered are different from the ones employed by these two authors.

Hasan (2002) derived a variable profit-sharing ratio that is a function of four variables: the rate of interest, the rate of profit (i.e. the ratio of profit to total capital), a risk premium and the leverage ratio (i.e. the ratio of the funds contributed by the financier to total capital). The model was built under the assumption that the profit-sharing ratio of the financier cannot be greater than his loss-sharing ratio. The interest rate in Hasan's (2002) model renders its acceptability problematic in the context of Islamic finance. Moreover, it can be shown that ultimately the return to the financier is equal to the interest

rate and the risk premium; this makes the robustness of the model questionable.

In Ahmad's (2002) framework the profit-sharing ratio is a function of the risk-free rate of return of the financier, the amount of funds invested, the auditing expenses, a safety index (defined by the author) and the expected income from the investment. Besides the difficulty of defining a risk-free rate in Islamic finance, some variables in the models (safety index and expected income) are not observable and induce a degree of subjectivity to their determination. The inclusion of the auditing expenses also seems superfluous, as nowadays an external audit is systematically carried out for corporations in many jurisdictions.

Furthermore, both studies lack empirical evidence to support the robustness of the model. Thus, in addition to choosing more objective variables as explained later, we conduct two types of simulations–Monte Carlo and backtesting–to test the consistency of the model with its theoretical characteristics.

Convertible bonds may also help mitigate the risk arising from the agency problem, since they are hybrid instruments, which combine features of straight debt and equity. They are straight debt packaged with a call option on the firm's equity, making it possible for convertible bondholders to participate in potential value gain sharing of the firm. This feature of convertible bonds makes them relatively insensitive to the risk of the issuing firm; while higher risk reduces the value of the straight debt component, it increases, at the same time, the value of the equity option component. For this reason investors are willing to pay more for a convertible bond than for a straight debt (Brennan and Schwartz, 1988).

Based on the above arguments in favor of a convertibility clause, such a condition in the *ṣukūk mushārakah* could be an effective risk mitigating device for the agency problem. From a juristic point of view, a convertible *ṣukūk* should not constitute an issue in itself as it represents a *ṣukūk* with an embedded option. Tariq and Dar (2007) made a case for the Sharīʿah acceptability of embedded options as they do not create a situation of excessive *gharar* and at the same time they can be formulated in such a way to serve the purpose of fairness in Islamic finance.

If we consider 'embedded option' as an additional condition to a contract, a case can be made for its permissibility as long as it is consistent with the injunctions of Islam and does not defeat the spirit of the contract in which it is involved. Indeed, the Prophet

(SAW) said: "*Muslims are bound by their stipulations unless it be a condition which turns ḥarām* (unlawful) *into ḥalāl* (lawful) *or ḥalāl into ḥarām."* (See Abū Dāwūd, n.d., 3:332).

Based on the above discussions, we argue that *ṣukūk mushārakah* with an embedded option do not, in principle, contradict Sharīʿah rules and can mitigate the agency problem raised above. Through the *sukūk mushārakah* the *ṣukūk*-holders are in a partnership with the issuing firm for a limited period. The convertibility clause gives them the right to prolong the partnership, at the end of the contract, to become shareholders of the company. In principle, nothing prevents the company at the end of the *mushārakah* contract to issue new shares even to non-*ṣukūk*-holders as long as it is done in a separate contract and all the terms of the new contract are in conformity with the Sharīʿah rules. Therefore, convertible *ṣukūk mushārakah* can be seen as a transaction consisting of two contracts executed separately at two different stages. The combination of different contracts is acceptable subject to certain conditions. Thus, after reviewing the works of the Muslim jurists on the question, Ḥammād [2][8] derives three parameters that govern the permissibility of combining contracts:

- The combination should not violate an explicit text, like combining a sale and a loan.
- The combination should not be a means to a prohibited element. An example of this is *bayʿ al-ʿīnah* where two sales are used to make a loan with interest.
- The combined contract should not contradict the nature and implications of the contracts involved. This may happen when the implications of the contracts involved contradict each other. This would be the case if, in *muḍārabah*, the capital is given to the *muḍārib* as a loan. In *muḍārabah* the capital is not guaranteed while in a loan the debtor is bound to return the capital.

Convertible *ṣukūk* are already present in the *ṣukūk* market. Dubai Port Convertible Mushārakah Ṣukūk are one of the most prominent convertible *ṣukūk*, however the presence of the purchase undertaking in the structure made it subject to several controversies as discussed in a previous section (A, ii).

8 The authors with Arabic references will be cited with their names followed by the number indicating the rank of the paper in the Arabic References list.

It is worth noting that the guidelines issued by the Islamic Financial Board Services (IFSB) on corporate governance for IFIs have dealt with the issue of protecting the rights of the depositors, as *rabb al-māl*, in Islamic banks. The guidelines' recommendation that the agent needs to make timely and adequate disclosure of all material information is also relevant in this context. All these strategies and measures put together would reduce the agency problem to a minimum level.

III. *SUKŪK MUSHĀRAKAH*: THEORETICAL ANALYSIS

A. The Economics and Mathematical Formulation

i. The Design of the Model

The model is based on the concept of *mushārakah*, which we will discuss later. By issuing the *ṣukūk*, the firm enters into a partnership contract with the *ṣukūk*-holders over the life of the *ṣukūk*. K_s is the capital contributed by the *ṣukūk*-holders whereas K_e is the book value of the total equity of the issuing firm. Thus the total capital K is:

$$K = K_s + K_e.$$

It is assumed that the firm does not have long-term debt; hence, after deducting the operating costs, the remaining amount of the revenue is to be shared by the equity-holders (i.e. shareholders) and the *ṣukūk*-holders. It is further assumed that there are no retained earnings over the life of the *ṣukūk*.

There is a juristic consensus that loss that is not due to negligence should be borne according to capital contribution. On the other hand, Muslim jurists have different opinions regarding the way the profit-sharing ratio is determined. In this study, we adopt the view that the profit-sharing ratio is according to the mutual agreement of the contracting parties. Here, the profit P referred to is operating profit; that is the remaining amount after deducting operating expenses from total revenue. It usually coincides with the Earnings before Interest and Tax (EBIT).

Since the *ṣukūk* in this case have almost the same risk profile as the equity capital, in that neither the capital nor the return is guaranteed, it makes economic sense to consider the industry (sector) Return on Equity (ROE_i) adjusted, to take into account the particularity of the firm, as a benchmark. Even though, from a legal perspective, the

relationship is between the firm and the *ṣukūk*-holders (as discussed later), from an economic viewpoint, the *ṣukūk* and equity have similar characteristics in terms of risk and return. In other words, the shareholders, like the *ṣukūk*-holders, do not perform any 'work'; their entitlement to profit emanates from their capital contribution; and for both, neither the capital nor the return is guaranteed.

Here are a few adjustments that we make:

- The profit should be adjusted for tax purposes such that:
  - In those jurisdictions where *ṣukūk* are treated like conventional bonds, the adjustments will be beneficial to the firm. This is because the sharing ratio is derived based on net profit (i.e. profit after tax); therefore, the tax saving as a result of the *ṣukūk* being considered tax deductible will accrue to the firm.
  - In those jurisdictions where *ṣukūk* are treated like equity, the adjustment will equate the adjusted profit to net profit.
- In stock valuation, β (the systematic risk of a firm that cannot be diversified away) is considered for adjustment purposes. In the same spirit as β, an adapted adjustment measure α can be derived to take into account the difference between different firms' risk profiles within the same industry. Since in this model the variable considered is ROE, α would be as follows:

$$\alpha = \frac{cov\ (ROE_f, ROE_i)}{Var\ (ROE_i)}$$

where:

- ✓ Cov (ROE_f, ROE_i) is the covariance of the ROE of the firm and the ROE of the industry;
- ✓ Var(ROE_i) is the variance of the ROE of the industry.

However, the required data to derive such a measure may not be available. Hence, in the remainder of the study β shall be used for adjustment purposes instead of α. Even though, β is derived based on the returns on stocks and the relevant index, it can be considered a good proxy for the purpose of the aforesaid adjustment.

With this in mind, the profit-sharing ratio λ we derive is variable and has an incentive-compatible feature for the firm. Thus, when the firm's return to the capital is equal to the benchmark (i.e. βḤ ROE_i),

then the equity-holders and the *ṣukūk*-holders will have equal return (as expressed by equation (1)). When the firm's return to capital is higher than the benchmark, the equity-holders will be 'rewarded' with higher return (as expressed by equation (2)). On the other hand, when the firm's return to capital is lower than the benchmark, the equity-holders' return will be lower than that of the *ṣukūk*-holders (as expressed by equation (3)). These are incentive-compatible features in that the firm would be penalized, with a lower share of the profit going to the equity-holders, if it underperforms the industry or misreports the actual profit. The above conditions can be translated as follows:

If $\frac{(1-T)\times P}{K} = \beta$Ḥ $\mathrm{ROE_i}$, then:

$$\frac{\lambda \times (1-T) \times P}{K_s} = R_s = R_e = \frac{(1-\lambda) \times (1-T) \times P}{K_e} = \beta \times ROE_i \qquad (1)$$

Where

- T denotes tax;
- P: denotes operating profit as defined above;
- λ is the profit share, attributable to *ṣukūk*-holders, which is such that:
  $0 < \lambda < 1$;
- R_s is the return to *ṣukūk*-holders;
- R_e is the return to equity-holders.
- ROE_i is the return on equity of the issuing firm industry (sector).
- β is the regression coefficient when the firm's stock return is regressed on the relevant index return.
- The remaining variables are as defined above.

- If $\frac{(1-T)\times P}{K} > \beta$Ḥ $\mathrm{ROE_i}$, then $R_e > R_s$ (2)
- If $\frac{(1-T)\times P}{K} < \beta$Ḥ $\mathrm{ROE_i}$, then $R_e < R_s$ (3)

The rationale for these relationships seems obvious. Since βḤ $\mathrm{ROE_i}$ is the benchmark, the returns to the equity-holders as well as that of the *ṣukūk*-holders should be equivalent when the firm realizes a result as good as the benchmark. When its performance is better than the benchmark, then that can be attributed to good management. Therefore, the equity-holders, who are the ultimate responsible

parties for the appointment of the management, should be rewarded with a higher return as compared to the *ṣukūk*-holders. In case the performance of the firm is less than the benchmark, then the equity-holders should be penalized for that with a lower return.
An incentive-compatible profit-sharing ratio which permits the above relationships to hold can be as follows:

$$\lambda = \frac{K_s}{K} \times f(K, \beta, ROE_i, P) \qquad (4)$$

Where K can be considered as constant over the period and f satisfies the following conditions:

- $\frac{\partial f}{\partial ROE_i} > 0$, i.e. f is an increasing function of ROE_i. This implies that, everything else being constant, when the ROE is higher so will be the share of the *ṣukūk*-holders; and vice versa.

- $\frac{\partial f}{\partial \beta} > 0$, f is an increasing function of β. This implies that, everything else being constant, when β is higher so will be the share of the *ṣukūk*-holders; and vice versa. The two relationships are justified on the ground that βḤ ROE_i is the benchmark, so if anyone of its components increases, everything else being constant, that should be translated into a higher share for the *ṣukūk*-holders, based on the previous reasoning.

- $\frac{\partial f}{\partial P} < 0$, i.e. f is a decreasing function of P. This means that, everything else being constant, when the profit is higher, the share of the *ṣukūk*-holders will be lower, implying a higher share for the firm, and vice versa. This is a direct implication of the incentive-compatible characteristics of the model, as explained above.

- For $(1 - T) \times P = K \times \beta \times ROE_i$, we have $f(K, \beta, ROE_i, P) = 1$ (5)
  i.e. when the performance of the firm is equal to the benchmark, then

$$R_s = R_e = \frac{(1 - T)P}{K}, \text{ then } R_e > R_s \qquad (6)$$

On the other hand, when the profit is negative, the loss is borne according to the capital contribution. Similarly, when the ROE_i is negative while the profit of the firm is positive, the sharing ratio follows the capital contribution. The following summarizes the main points above:

$$\begin{cases} \lambda = \dfrac{K_s}{K} \times f(K, \beta, ROE_i, P), & if \quad P > 0 \; and \; ROE_i > 0 \\ \lambda = \dfrac{K_s}{K}, & if \; P < 0 \; or \; ROE_i < 0 \\ 0 < \lambda < 1 \end{cases} \tag{7}$$

Many functions may satisfy these conditions. We have constructed the following function, which satisfies the above conditions:

$$f(K, \beta, ROE_i, P) = \frac{Log(K \times \beta \times ROE_i)}{Log((1 - T) \times P)} \tag{8}$$

However, in order for this function to be suitable for the model, the variables should verify few additional constraints (see Appendix 1, for the details of the derivation). Thus the function λ *is as follows:*

$$\begin{cases} \lambda = \dfrac{K_s}{K}, \; if \; (1 \quad T) \times P \leq 1, \; K \times \beta \times ROE_i \leq 1, \; (1 \quad T)P \leq (K \times \beta \times ROE_i)^{\frac{K_s}{K}} \\ \lambda = \dfrac{K_s}{K} \times \dfrac{Log(K \times \beta \times ROE_i)}{Log((1 - T) \times P)}, & otherwise \end{cases} \tag{9}$$

The following (Monte Carlo) simulation and backtesting will be done with this function.

Ṣukūk mushārakah, thus designed, are in a new asset class with some features of both debt and equity. Like debt instruments, the *ṣukūk* have fixed maturity, meaning that at some point of time in the future the issuing firm has to redeem the *ṣukūk*. However, in contrast to debt instruments, the claim on the *ṣukūk* is residual, implying that the *ṣukūk*-holders like the shareholders will receive payment if there is positive profit.

ii. The Pricing of Ṣukūk Mushārakah

The assumption made for this valuation as well as for the simulations is that the investors have a long-term horizon and their intention is

to 'buy-and-hold' the *ṣukūk*. They liquidate their position only when some unforeseen circumstances force them to do so (for instance, need for liquidity). This assumption, which is consistent with the prevalent behavior in the *ṣukūk* market, implies that only the future cash flows, in the form of dividends and principal payment at maturity, matter for the *ṣukūk*-holders. It has the advantage of isolating the negative impact that speculators would have on the *ṣukūk* price, meaning that only the real performance of the company affects the yield. The assumption is theoretically well grounded. The prominent economist Keynes (1936) severely criticised speculative activities, which consist of forecasting the psychology of the market, and distinguished them from enterprise, defined as forecasting the prospective yield of assets over their whole life. He further maintained that:

> *Speculators may do no harm as bubbles on a steady stream of enterprise. But the position is serious when enterprise becomes the bubble on a whirlpool of speculation. When the capital development of a country becomes a by-product of the activities of a casino, the job is likely to be ill-done."* (Keynes, 1936: 102-106).

With this in mind, the valuation of the *ṣukūk mushārakah* in the secondary markets at any point of time before maturity follows the same logic as the valuation of stocks (or bonds), which consists of calculating the present value of future cash flows. The periodic payments to *ṣukūk*-holders can be considered as dividends in addition to the redemption price of the *ṣukūk* at maturity.
Thus, the adapted formula is:

$$PV = \sum_{k=1}^{n} \frac{CF_k}{(1+r)^k} + \frac{RP}{(1+r)^n} \qquad (10)$$

Where:
PV = the present value of one unit of *ṣukūk mushārakah*;
n = the number of periods (e.g. years) from the date of valuation to the maturity date;

CF_k = the cash flow at period "k" which is given by:

$$= \frac{\lambda \times (1-T) \times P}{Numbers\ of\ units\ of\ Sukuk} \qquad (11)$$

RP = the redemption price, which is equal to the initial value of the *ṣukūk* less any loss or plus any value gain;
r = is the required rate of return of the *ṣukūk*-holders.

It is important to remark that, contrary to the conventional bond, both CF_k and RP are variable and may be equal to zero.

The identification of risks present in *ṣukūk mushārakah* is crucial for a proper pricing exercise. This is because the price of the *ṣukūk*, like any other financial asset, is a function of their payoff (i.e. the items in the numerators in equation (10)) and the discount factor which depends on the required rate of return r. There exists a positive relationship between the risk associated with the payoff and the required rate of return. Thus, in conventional finance, if a bond is issued by a government with a probability of default close to null, the required rate of return r will be equal to the risk-free rate, i.e., the lowest rate possible, due to the payoff certainty. On the other hand, the investors require a risk premium to be added to the risk-free rate to buy a risky asset like a common stock. Indeed, the cash flows associated with common stock in the form of dividends (and selling price for an investor with short term horizon) are not guaranteed nor fixed; therefore, the investors need to be compensated with a risk premium for taking additional risk.

Like common stocks, the *ṣukūk mushārakah's* claim is residual and is based on the performance of the issuing company. Thus, we shall discuss two types of risk that will have an impact on the risk premium, which will be translated into higher r; these are: business risk and credit risk. One could further add liquidity risk to these two kinds of risk; however, with the assumption stipulating the prevalence of 'buy-and-hold' in the *ṣukūk* market, the liquidity risk premium is also assumed to be small. On the other hand, the investors could require an additional premium already termed as 'novelty premium', since the *ṣukūk* are new financial instruments. Such a premium has been discussed in the context of Argentina GDP-Linked Warrant recently introduced in the market. However, we assumed such a premium to be small too.

Business risk is certainly the most serious risk for *ṣukūk mushārakah*. Business risk refers to uncertainty associated with operating cash flows which are a function of the revenues and the expenditures. Revenues depend on the conditions of the economy in a specific country and the industry in which the company operates as well as the actions of the management and its competitors; for

foreign investors, the country risk is also a factor to be taken into consideration (Fabozzi and Modigliani, 2009: 455). Given a country, the components of the business risk are captured in the mathematical relationships showing that the periodic payments CF_i are function of the profit-sharing ratio λ and the operating profit P. In turn, λ depends on the industry ROE_i, β and P. The conditions of the economy and the industry are reflected through the variable ROE_i. When the economy is booming, the ROE_i will be higher and the investors will expect higher CF_k which means higher price or lower required rate of return for the *ṣukūk*. On the other hand, the actions of the management are captured by the operating profit P and β. Like the ROE_i, both are positively related to CF_k, implying the same effect on the required rate of return.

Credit risk is defined, for a conventional debt, as the risk that the borrower will fail to satisfy the terms of the obligation with respect to the timely payment of interest and repayment of the amount borrowed (Fabozzi and Modigliani, 2009: 454). Even though *ṣukūk mushārakah* are different from debt instruments in that the periodic payments are not fixed but residual, it is important to notice that the repayment of RP (i.e., K_s less any loss or plus any gain) is to be made at the maturity of the *sukūk*. Therefore, credit risk in the *ṣukūk mushārakah* mainly pertains to the uncertainty surrounding the principal repayment at maturity.

It is interesting to note that the pricing of *ṣukūk mushārakah* will be made easy by their similarities to common stocks. The players in the financial markets just need to make some adjustments to take into account their specificities.

The above discussion pertains to the case where the *ṣukūk* are not convertible. However, a clause of convertibility can be added, and a formula for the redemption price needs to be derived. The convertibility clause can be included in the contract to prevent any opportunistic behavior by the firm that could be detrimental to the interest of the *ṣukūk*-holders. For instance, the contract can be formulated so that the convertibility is triggered when the return goes below a threshold a number of times. However, in this paper we will not delve into the derivation of the conversion price or into the specification of the triggering events, as such discussions deserve a separate study.

B. An Analysis of the Model from a Sharīʿah Perspective

Sharīʿah compliance is a necessary condition for any product to be acceptable in Islamic finance. Two main aspects of Sharīʿah compliance can be identified:

- conformity to the key Sharīʿah rulings pertaining to commercial transactions, such as the principle of mutual consent, the prohibition of *ribā* (interest), *gharar* (uncertainty), *maysir* (gambling) and illicit goods;
- upholding *maqāṣid al-Sharīʿah* (the objectives of Sharīʿah) in transactions, which consist of realizating *maṣlaḥah* (public interest) in the outcome and achieving fairness in the terms of the contract. (See Diaw and Boon Ka (2010) for elaboration.)

Showing the Sharīʿah compliance of the *ṣukūk mushārakah* requires, therefore, testing them against the elements in the two aforementioned aspects.

Analyzing the conformity of a product with Sharīʿah principles in the light of the first aspect (i.e. key Sharīʿah rulings in commercial transactions) can be carried out in two equivalent ways. The analysis can be done indirectly by showing that the product is in conformity with each of the five elements mentioned under that aspect. The analysis can also be done directly by proving that the underlying transaction fits one or a combination of Sharīʿah nominate contracts. We adopt the latter method as it appears more convenient.

i. Ṣukūk Mushārakah: A Fiqh Discussion of Some Issues

Mushārakah or *sharikah* is one of the contracts endorsed by Islam at its advent. It has been legally justified by the scholars based on the Qur'ān, the Sunnah (i.e., what the Prophet said, did and approved of) and *ijmāʿ* (i.e. the consensus of the competent Muslim jurists) (Al-Zuhayli, 2003). In the following section we shall address some issues pertaining to the counterparty of the *ṣukūk*-holders, the capital, the profit-and-loss sharing and the management.

The Counterparty of the Ṣukūk-Holders

The classical *fiqh* books have not specifically addressed this issue, since modern corporations as they are legally structured nowadays were not in existence during that time. Thus, some contemporary scholars have discussed the issue to point out the Sharīʿah position.

One of the Dallah al-Baraka Forums, which bring together panels of Sharīʿah scholars, has issued a fatwa addressing various aspects of the question. Even though the discussion was carried out in the context of *muḍārabah*, with depositors as *rabb al-māl*, the rules remain the same. According to that fatwa, it is the financial institution, as a separate legal entity, which is the *muḍārib*. This is because the financial liability does not rest on the shareholders, or the board of directors, or the management; rather, it rests on the institution. Thus, a change in the composition of the shareholders or the board of directors or the management does not affect the relationship between the financial institution as *muḍārib* and the depositors as *rabb al-māl* (Dallah al-Baraka Fatwa No (10/10)). Although from a legal perspective the relationship is between the firm and the *ṣukūk*-holders, financial analysis shows a similarity between the risk-return characteristics of the *ṣukūk mushārakah* and that of equity. In other words, the shareholders, like the *ṣukūk*-holders, do not perform any 'work'; their entitlement to profit emanates from their capital contribution; and for both, neither the capital nor the return is guaranteed, as we have already explained.

Conditions on the Capital

The capital is an essential element of *mushārakah*; thus, certain conditions regarding the capital should be met for the validity of the contract. The majority of classical jurists hold that the capital contribution should be in the form of fungible money (e.g. contemporary currencies). According to this view, non-fungible assets (e.g. real estate) are not eligible to become a part of the capital contribution in a *mushārakah* business. However, the Mālikīs hold a different view, stipulating the permissibility of a partnership with capital contribution in the form of non-fungible assets so long as their value can be ascertained at the conclusion of the contract (Al-Zuhayli, 2003: 458-460; Mansuri, 2006: 249-251).

Furthermore, the capital of the partnership should be *ʿayn* (i.e., existent and possessed) as opposed to *dayn* (i.e., promised but absent). The presence of the capital does not necessarily mean physical presence at the conclusion of the contract; it is sufficient that the asset capital is made available at the time of the transaction (al-Zuhayli, 2003: 458-460; Mansuri, 2006: 249-251).

Although the issuing firm of a financial security may have different classes of assets, it has become quite easy with the advance in accounting sciences to provide a fair valuation of these assets and

therefore determine the value of the equity capital. In this paper, the book value of equity at the time of the *ṣukūk* issuance and the proceeds from *ṣukūk* issuance will be considered as the capital contribution. As shown previously, this is acceptable according to the Mālikīs. The book value of equity is preferred over its market value as the former is generally arrived at based on the valuation of professionals and exhibits less volatile behavior. In contrast, market value is influenced, in many cases, by speculative activities that impair the accuracy of the valuation.

Conditions Pertaining to Profit and Loss

There is consensus (*ijmāʿ*) among Muslim scholars that when the *mushārakah* business incurs loss, it should be borne proportional to the capital contribution. They also agree that profit shares cannot be in the form of fixed amounts; shares should rather be in the form of ratios. However, they differ whether it is permissible for a profit-sharing ratio to be different from the capital contribution. The Ḥanbalīs, the Zaydīs and many Ḥanafīs are of the view that the profit-sharing ratio may differ from the capital contribution ratio. This view follows from the *ḥadīth*: "*Profits are shared as stipulated in the contract, while losses are shared in proportion to capital shares."*[9] To the Ḥanafīs, a partner in a partnership is entitled to profit due to one of three factors:

- capital
- work/management
- liability for damages (*ḍamān*)

However, if a partner expressly excludes himself from the responsibility of work for the business he cannot be entitled to more than the ratio of his capital contribution (Usmani, 1999).

In addition to this, some contemporary jurists allow the variability of the profit-sharing ratio as a form of incentive to the partner. In its fatwa 11/8, the Dallah al-Baraka Forum maintains that it is permissible to make the profit-sharing ratio vary as a function of time or of the realized profit. For instance, the profit-sharing ratio can be set at 10% for one of the partners and 90% for the other in the first year, and in the following year the ratios change to 20% versus 80%,

9 Some *Sunan* list this *ḥadīth* on the authority of ʿAlī; see Al-Zuhayli (2003) for more details.

etc. Similarly, it is allowed, for the purpose of incentivizing one of the partners, to set the ratios at, for example, 60% for one of the partners who provides work in addition to capital, and 40% for the other. Once the return on capital of the latter reaches 10%, the ratios could change to 70% versus 30% (Dallah al-Baraka, Fatwa No. 11/8).

Based on this juristic argument, we have adopted a variable profit-sharing ratio between the issuing firm and the *ṣukūk*-holders, which is incentive compatible for the firm such that higher profit induces a greater share.[10]

Conditions Pertaining to the Management

It is permissible that the work/management of the partnership be carried out by both of the partners or by either of them. It is highlighted that what matters for the applicability of the legal opinions pertaining to work is the condition of work, not its actual realization (al-Zuhayli, 2003).

ii. Ṣukūk Mushārakah: An Assessment in the Light of Maqāṣid al-Sharīʿah in Transactions

The *ṣukūk mushārakah* model meets the first objective of Sharīʿah in transactions, which stipulates that the outcome should be beneficial to the community. This is because, not only do they allow deals that benefit the contracting parties, but also because they do so in a better way than many traditional investments. Investment is supposed to support productive activities; however, it is not evident that many investments in the stock market and mutual funds serve the real economy. The *ṣukūk mushārakah*, as designed above, do. The proceeds from the *ṣukūk* issuance are normally used by the issuer for

10 It is important to mention that even though the profit-sharing ratio is not fixed at the beginning, the validity of such as scheme can still be demonstrated. Indeed, some Muslim jurists allow selling an item at market price in the future. Wahba Zuhayli, in his *al-Fiqh al-Islami wa Adillatuhu*, vol. 7, in the chapter on financial markets, reports that Imām Ahmad, Shaykh Ibn Taymiyyah, Imām Ibn al-Qayyim, and some contemporary scholars allow such a transaction. Such a position is justified on the ground that this form of ignorance does not lead to dispute. If we remember that the conditions for sale-based contracts are stricter than for partnership contracts, it follows that the above position of some scholars combined with the principle of permissibility in *muʿāmalāt* (transactions) are sufficient proof for the acceptability of the way the profit-sharing ratio is determined.

business expansion that ultimately adds value to the economy. Hence, the underlying transaction of the *ṣukūk mushārakah* constitutes a *maṣlaḥah* (i.e. benefit) in that their outcomes are beneficial to the society.

The terms of the contracts in the *ṣukūk mushārakah* model are balanced. This is evidenced by its risk-sharing characteristics. Loss is shared proportionately to the capital contribution and return is also shared as agreed by the contracting parties. The incentive-compatible feature of the model is of a nature to render any opportunistic behavior of the party with more information redundant. This is the essence of partnership.

IV. SUKŪK MUSHĀRAKAH: EMPIRICAL ANALYSIS

The returns to the *sukūk*-holders as well as those to the shareholders in the proposed model depend on many variables such as the industry ROE and the operating profit of the issuing company. The results of the simulation provide us with an overall view of the return distributions. By studying these distributions, we shall examine the consistency of the empirical results with the incentive-compatible feature of the mathematical model. In addition to this, we shall analyze the sensitivity of the returns to the above variables.

A. Monte Carlo Simulation

i. Method and Data

Monte Carlo Simulation (MCS) permits us to obtain the return distribution of the model based on various scenarios. It is suitable for a *What-if* analysis by allowing the interactions of the input variables within their respective range of values to generate outputs. The precision of the results increases along with the number of iterations. The error in the estimate of a parameter is approximately proportional to $\frac{1}{\sqrt{N}}$, where N is the number of iterations. MCS has been widely used in many areas such as option pricing, risk management and product development (Bender, 2000:105; McLeish, 2005: 4-7; Raychaudhuri, 2008).

In the context of this paper, the profit-sharing ratio as in equation (9) will be used to determine the returns to *ṣukūk*-holders and shareholders:

$$\begin{cases} \lambda = \dfrac{K_s}{K}, \ if\ (1 \quad T) \times P \le 1,\ K \times \beta \times ROE_i \le 1,\ (1 \quad T)P \le (K \times \beta \times ROE_i)^{\frac{K_s}{K}} \\ \lambda = \dfrac{K_s}{K} \times \dfrac{Log(K \times \beta \times ROE_i)}{Log\big((1-T) \times P\big)}, \qquad otherwise \end{cases} \tag{9}$$

And

$$R_s = \frac{\lambda \times (1-T) \times P}{K_s} \quad (for\ the\ Sukukholders)$$

$$R_e = \frac{(1-\lambda) \times (1-T) \times P}{K_e} \quad (for\ the\ shareholders/equityholders)$$

Thus, λ and the return functions will play the role of static model. For the shareholders, two cases will be considered: the case where the *ṣukūk* are tax deductible and the case where they are not.

As it appears in the theoretical determination of the model, the input variables that are likely to have greater impact on the returns to the *ṣukūk*-holders are the industry ROEs, the firm operating profit, and the β of the firm.

We collected the annual ROEs for 16 sectors in Malaysia from 2005 to 2009. From this historical data, the probability distribution for the ROE_i is generated.

Similarly, the operating profits of 16 companies, selected among the *ṣukūk*-issuing companies in Malaysia, were collected for the same period. However, the variable of interest here is the distribution of the growth rate of the operating profits. This is because the selected firms do not have the same size; therefore, what would be important is the growth rate instead of the value. Given the distribution of that growth rate, the operating profits are set based on the average derived from the results obtained by computing the operating profit of a firm as a percentage of its long-term liability in the sample. β is a measure of the variability of the returns on a given stock with respect to that of the index benchmark. β is the coefficient for the independent variable (in this case, the index return) in a linear regression. Thus, we compute the annual β for 23 companies, from 2005 to 2009, based on weekly data. For each regression, the returns on the Malaysian Stock market index, **FBMKLCI,** are taken as independent variables whereas the returns on the company's stock are the dependant variables. For all the above data, the size is determined by the availability of the data.

For the companies considered in this study the average leverage ratio (i.e. long-term debt over total equity) is 38%. In carrying out the simulations, we took that ratio as the base case.

Throughout the simulations the number of iterations is N = 10,000. The software used for the Monte Carlo Simulation is @ Risk.

ii. Analysis of the Results

In this part we present and analyze the results of the simulations. The outputs of interest are the distribution of the Profit and Loss Sharing Ratio (PLSR) λ (lambda), as per equation (9), and that of the returns to *ṣukūk*-holders as well as to the shareholders. For the return to shareholders, two scenarios will be considered:

- Scenario 1, where the *ṣukūk* receive the same tax treatment as conventional bonds, which implies tax deductibility.
- Scenario 2, where the *ṣukūk* do not receive such a treatment.
- For each output we will consider the characteristics of the distribution and the most important factors affecting the distributions.

λ (Lambda) Distribution

One of the main objectives of the model is to design an incentive-compatible PLSR that would reward the *ṣukūk*-issuing firm for good performance with a higher share in profit; at the same time, low reported profits would penalize it through a lower share in the profit. Chart 1 represents λ distribution. It shows that for 90% of the cases, λ, which corresponds to *ṣukūk*-holders' share in the profit, falls in the range between 18.3% and 39.3%, with a mean value of 27.4%, which is slightly higher than the share of the *ṣukūk*-holders in the capital (25%). The sources of this increase in the *ṣukūk*-holders' share can be unveiled by looking into the regression coefficients in Chart 2.

Chart 1: Lambda Distribution

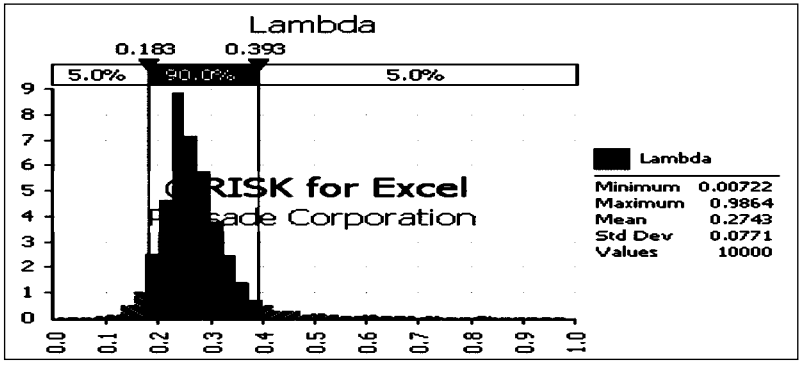


Chart 1 shows λ distribution, which is the share of the ṣukūk-holders in the profit.

It appears from Chart 2 that the Operating Profit is negatively related to λ and has the highest effect on it. In other words, an increase of 10% in the profit will cause a decrease of 4.7% in the *ṣukūk*-holders' share and vice versa. On the other hand, the beta of the firm and the industry ROE are directly related to lambda, with a coefficient of 0.34. These relationships confirm the incentive-compatible feature of the model, as explained above.

Chart 2: Lambda Regression Coefficients

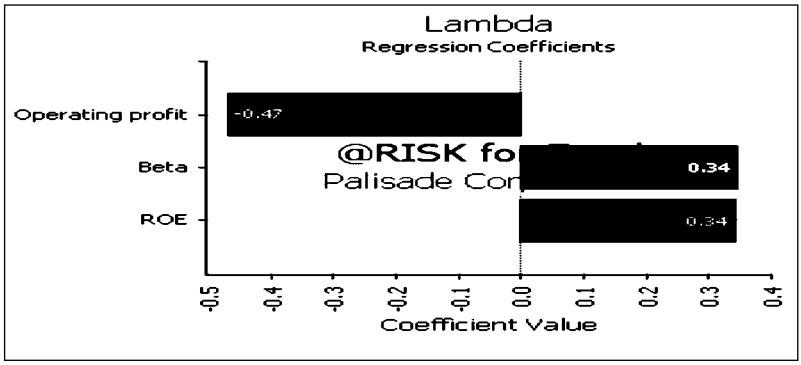


Chart 2 shows the sensitivity of the λ (ṣukūk-holders' share in the profit) with respect to the company operating profit, the company beta and the industry ROE.

Thus, the higher profit share of the *ṣukūk*-holders, as compared to their capital share, can be attributed to lower profits of the issuing

firm relatively to the average industry and/or a higher systematic risk, as measured by beta.

Returns Distributions

Charts 3, 4 and 5 correspond to the distributions of the returns to the *ṣukūk*-holders and to the shareholders in the two scenarios mentioned above. (The results are based on equation (9).) For the convenience of the analysis and the comparison, we divide the distributions into 3 regions:

- A region which corresponds to negative returns;
- A region which corresponds to the top 5% of the returns;
- The in-between region, which corresponds to around 90% of the returns.

For all the three distributions the negative returns correspond to only 4.8%, implying that in more than 95% of the cases the returns are positive.

Chart 3: The Distribution of Returns to Ṣukūk Holders

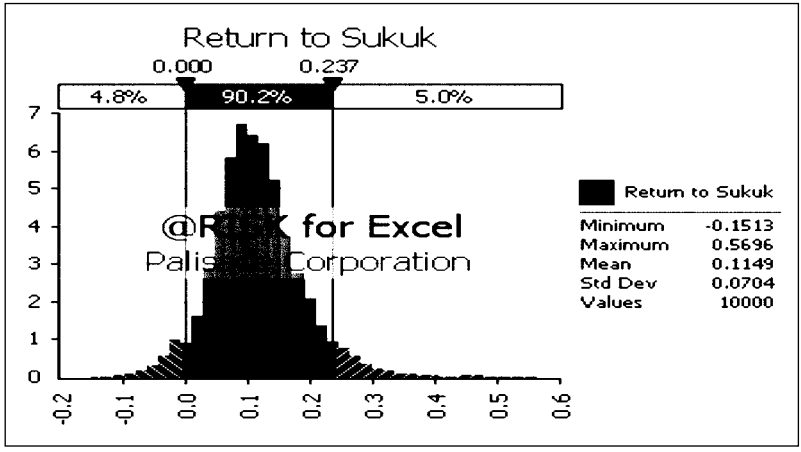


Chart 4: The Distribution of Returns to the Shareholders under Scenario 1 (i.e. Tax Deductibility)

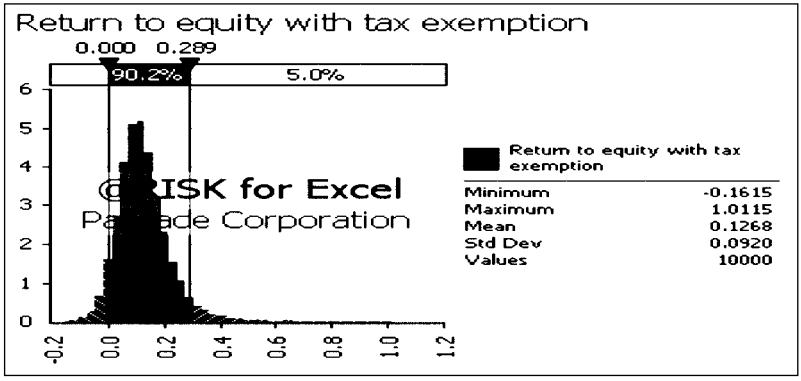
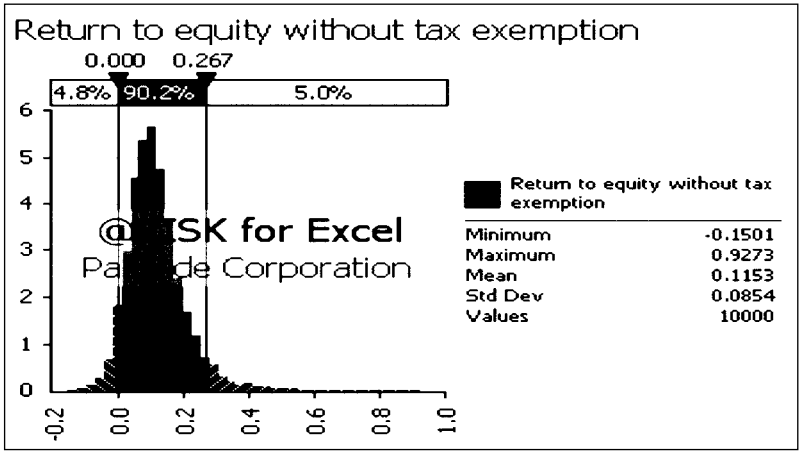


Chart 5: The Distribution of Returns to the Shareholders under Scenario 2 (i.e. Without Tax Deductibility)



The similarity of the probability of negative return suggests that the model allows a fair sharing of risk among the securities holders. Moreover, this probability of loss has important implications for risk management as it provides an indication of the amount of reserve to be set aside to protect the capital of both *ṣukūk*-holders and shareholders. As for the positive returns, around 90% of the returns to the *ṣukūk* fall between 0 and 23.7%, with an average return of 11.5% and a standard deviation of 7%. The figures of the distribution of the returns to the

shareholders in Scenario 2 are close to the above statistics. However, for Scenario 1, where the *ṣukūk* are tax deductible, the returns to the shareholders become quite different from those to the *ṣukūk*-holders, with an average return of 12.7% and a standard deviation of 9%; the interval [0; 28.9] contains 90% of the returns.

The average return to the securities holders (i.e. shareholders and *ṣukūk*-holders) in all scenarios is of two digits, a yield higher than the usual average return on fixed-income securities that carry lower risk. This result is in consonance with the empirical evidence, which shows that the arithmetic average of annual rate of return of the world's large stocks, over the period 1926 – 2005, is 11.46%, whereas the corresponding figure for the world's bonds is 6.14% (Bodie, Kane, and Marcus, 2009: 136). All this confirms the established financial theory stipulating a positive relationship between risk and return.

Chart 6: Regression Coefficients for Return to Ṣukūk holders

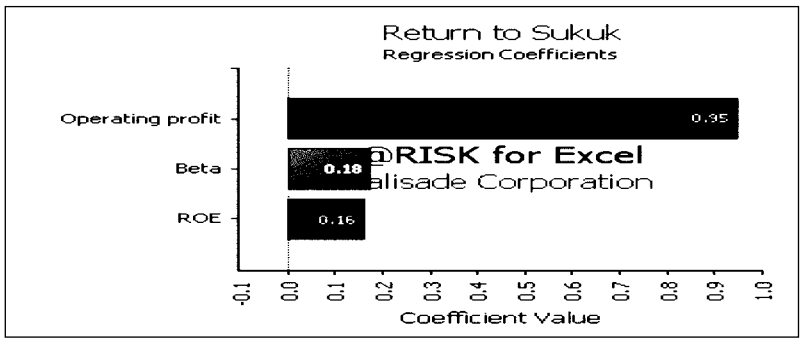


Chart 6 shows the sensitivity of the return to ṣukūk-holders with respect to the company operating profit, company beta and industry ROE.

Chart 7: Regression Coefficients for Return to Shareholders (Scenario 1)

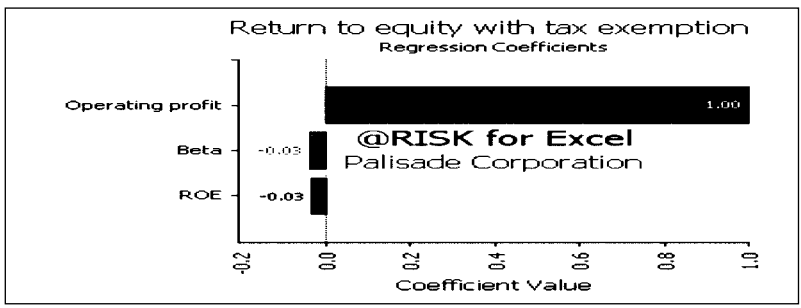


Chart 7 shows the sensitivity of the return to shareholders (when the ṣukūk are tax deductible) with respect to the company operating profit, company beta and industry ROE.

Chart 8: Regression Coefficients for Return to Shareholders (Scenario 2)

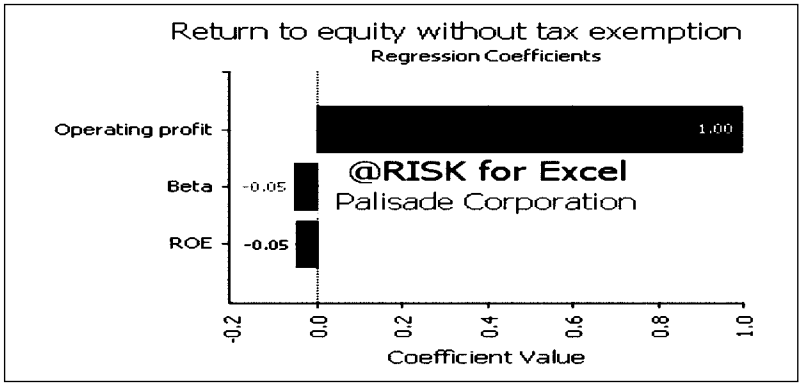


Chart 8 shows the sensitivity of the return to shareholders (when the ṣukūk are not tax deductible) with respect to the company operating profit, company beta and industry ROE.

For all three distributions, the main driver of the returns is the operating profit, as is evident in Charts 6, 7 and 8, where the regression coefficients are greater or equal to 0.95 for all distribution. For the *ṣukūk* it means that a 10% increase in the operating profit will be translated into a 9.5% rise of the return. Even though the profit share of the *ṣukūk*-holders, as measured by lambda, is negatively correlated with operating profit, this does not mean that the *ṣukūk*-holders do not benefit from the increased profit. The figures simply put forward that an increase in the profit enhances the return to the shareholders more than it does to the *ṣukūk*-holders. This result confirms the incentive-compatible propriety of the mathematical model.

Furthermore, the relationship between the operating profit of the issuing firm and the returns to the securities holders, coupled with the loss distribution that we discussed previously, shows that the model allows the interests of these stakeholders to move in the same direction, by allocating loss and profit in a balanced manner.

On the other hand, the regression coefficients for beta and ROE are positively correlated to the *ṣukūk*-holders' returns but negatively related to those of the shareholders. This result is understandable even intuitively, as the product of beta and ROE constitutes the benchmark for the *ṣukūk*-holders. Thus, a rise of that benchmark implies a higher share in the profit for the *ṣukūk*-holders as these two variables are directly related to lambda. At the same time, this means a lower share for the shareholders in the profit.

B. Backtesting

The Monte Carlo Simulation (MCS) allows testing the model under various hypothetical but plausible scenarios. In this part we proceed to examine the behavior of the model by employing backtesting that deals with actual data.

i. Data and Method

Backtesting is a method that permits the comparison of the ex-ante forecast from a model to the actual or ex-post realization of the variable of interest (Christoffersen, 2008). Backtesting has been used in academia as well as in the finance industry to detect possible flaws in a model and check the consistency of its predicted properties. The Basel Committee on Banking Supervision (BCBS) has endorsed the use of backtesting in conjunction with the internal models approach to determine market risk capital requirements. Thus, the backtest helps evaluate and validate the model being used internationally by banks in agreement with the regulatory body (BCBS, 1996; Lehikoinen, 2007: 24).

To carry out the backtest, the relevant data have been collected for five companies in Malaysia. The companies are: (i) Bina Darulaman; (ii) Kwantas; (iii) Nestle; (iv) Sime Darby; and (v) Tenaga Nasional. The corresponding sectors are accordingly: (i) engineering; (ii) construction & infrastructure; (iii) consumer goods; (iv) oil palm & plantation; and (v) utilities. All these groups or their subsidiaries have already issued *ṣukūk*. Again, the size of the sample is limited by the availability of the data pertaining to the variables involved and the time horizon.

Thus, the needed data to carry out the backtest are: total equity, total long-term debt, the operating profit, firm beta, and sector ROE over the period from 2005 to 2009. The results are based on the same equations used for the MCS.

ii. Analysis of the Results

A General Description of the Results

With the results for five companies over five years (see Appendix 2), we collect 25 observations for each of output variables of interest, namely: the return to *ṣukūk*; the return to equity in both cases, where

the *ṣukūk* are tax deductible and where they are not (referred to in the tables Return to eq2 and Return to eq1, respectively). In these observations, there are three plausible scenarios that need particular consideration:

- Scenarios where the issuing firm performs better than the average industry and thus has higher return to capital than the benchmark (i.e., β Ḥ ROE_i). This occurs in 6 cases.
- Scenarios where the firm underperforms the benchmark, but still has a positive return. These are the most frequent cases, with 18 occurrences.
- A scenario where the firm incurs loss.

Table 1 provides summary statistics of the results of the backtest (The detailed results are in Appendix 2). Except for Nestlé, the average returns to *ṣukūk*-holders for the other four companies, over the five years, are higher than average returns to eq1 but lower than those to eq2.

Only Kwantas has experienced all the three scenarios over the five years of study. In the same period, Nestlé has underperformed the benchmark only once; the opposite is true for Bina Darulaman. The results of the two remaining companies fall in the second scenario where the company underperforms the benchmarks, but still has positive return.

Table 1: Summary Statistics of the Backtest Results for the Period 2005-2009

Company	Average return on total capital (%)	Average benchmark (%)	Average return to Sukuk (%)	Std Dev.	Average return to Eq1[1] (%)	Std Dev.	Average return to eq2[2] (%)	Std Dev.
Bina Darulaman	6.52	11.75	7.68	1.16	6.01	0.97	8.4	1.43
Kwantas	**7.19**	**12.75**	**7.27**	**7.81**	**6.75**	**8.11**	**9.76**	**10.24**
Nestlé	44.89	27.42	38.36	16.32	47.69	9.52	63.88	11.29
Sime Darby	**11.47**	**20.30**	**11.84**	**2.12**	**10.84**	**2.14**	**14.65**	**2.84**
Tenaga Nasional	6.47	9.34	6.76	1.24	6.15	1.24	10.17	1.79

All the observations are in conformity with the expected properties of the mathematical model. Thus, when a firm underperforms the benchmark, the rate of return to the *ṣukūk*-holders is higher than that to the shareholders, whereas the latter get a higher return in case the firm outperforms. However, this is only true in case the *ṣukūk* are not tax

deductible. If they are, the results are mixed; the difference between the return to eq2 and the return to *ṣukūk* can be as low as -0.81% and as high as 32.24%. This result does not indicate a flaw in the model; it simply shows how tax regime can impact the characteristics of a financial instrument. If the rate of return to eq2 is higher than that of *ṣukūk* in some cases where it should be lower, it is due to the assumption that the amount saved as a consequence of the tax regime goes to the shareholders exclusively. An obvious implication of this observation is that to encourage the issuance of this model of *ṣukūk,* regulatory authorities should adopt a favorable tax regime whereby the *ṣukūk* get a tax treatment similar to that of interest.

On the other hand, to motivate and recompense the management and employees for good performance, a share in the profit should be allocated to them whenever the results of the company are better than the benchmark. This becomes particularly relevant in case the *ṣukūk* are tax deductible.

The average effective interest rate or profit rate on long-term debt over the five years differs between the companies, with some rates as low as 3.4% (for Nestlé) while others are greater than 6.88% (for Kwantas) (See the complete figures in Appendix 2). The results of the backtest show that the lowest return to the *ṣukūk*-holders would be 6.76% (with Tenaga Nasional), while the highest would be 38.36% with Nestlé. But if we recall the difference in risk profile between the fixed income securities issued by the companies and the proposed *ṣukūk*, the discrepancy in return becomes normal. Over the period 1926 -2005, the arithmetic average annual rate of return of the US small stock is 17.95% which is much higher than the corresponding figure for the World Bonds of 6.14 %, over the same period (Bodie et. al., 2009: 136).

Thus, from the issuing firm's perspective, the cost of issuing *ṣukūk mushārakah* would be higher as compared to debt instruments, but at the same time it would mean lower bankruptcy risk.

An Example of Analysis: the Case of Kwantas

The case of Kwantas is interesting in that the firm has experienced all the plausible scenarios. Thus, from year 2005 through year 2007 Kwantas realized positive profits, but still lower than the benchmark, hence the return to *ṣukūk* would be higher than that to eq1 for all the three years, and in year 2006 for eq2. Year 2008 constitutes a good one for the company, as it outperforms the benchmark. As a result, the return to the *ṣukūk*-holders (17.08%) would be lower as compared to

eq1 and eq2 (17.85% and 24.04% respectively) though higher than the benchmark (14.62%). In 2009 Kwantas incurred a loss that would be borne by the *ṣukūk*-holders and the shareholders in proportion to their capital contribution.

The backtest results thus confirm the hypothesized characteristics of the mathematical model where the holders of the two types of securities face together the risk of incurring loss but would get higher return as compared to debt-based securities. Furthermore, the model exhibits an incentive-compatible feature in the sense that good performance of the issuing firm is associated with a higher share to the shareholders, and conversely, low performance–as compared to the benchmark–means a lower share.

C. Hypothetical Example

ABC Berhad is a Malaysian company in the engineering and construction business. ABC Bhd won a contract which requires the increase of its production capacity by 40%, starting from January 2012. The amount needed for that is RM 100 million. The company's total equity is RM 400 million, and it does not have long-term debt. Thus, raising the needed funds through the issuance of *sukuk mushārakah* means that the *ṣukūk*-holders have a stake of 20% in ABC Bhd. The tenor of the *ṣukūk* is five years. The following is additional information based on the estimation of reliable experts:

Table 2: Estimates of the Input Variables for the Period 2012-2016

	2012	2013	2014	2015	2016
Operating Profit (RM million)	55	30	64	83	91
ABC's beta	1.4	1.2	1.1	0.8	0.9
Industry ROE (%)	14.5	10.5	12	12.5	14.5

Currently the tax rate is 26%, and it is assumed to remain constant over the next five years. The discount rate for the *ṣukūk mushārakah* is estimated at 13%. It is assumed that the total capital of RM 500 million (i.e. RM 400 million of equity and RM 100 million from the *ṣukūk* issuance) will remain constant over the period. Given that the face value of a unit of *ṣukūk mushārakah* is RM 1,000, ABC Bhd needs to evaluate the present value of cash flows generated by the *ṣukūk mushārakah* to determine the number of units of *ṣukūk* to be issued. Equation (9) is again used for that purpose, and the results are in the following table.

Table 3: Results of the Hypothetical Example

	2012	2013	2014	2015	2016
λ	0.249	0.267	0.217	0.190	0.199
$CF_k = \lambda \times (1 - T) \times P$(RM Mil.)	10.147	5.934	10.287	11.670	13.367+100

Using equation (10), the Present Value (PV) is then given by:

$$PV = \sum_{k=1}^{5} \frac{CF_k}{(1.13)^k} + \frac{100}{(1.13)^5}$$

$$= \frac{10.147}{1.13} + \frac{5.934}{1.13^2} + \frac{10.287}{1.13^3} + \frac{11.670}{1.13^4} + \frac{113.367}{1.13^5}$$

= RM 89.445 million

Thus, ABC Bhd needs to issue around 111,810 units of *ṣukūk mushārakah*, with fair price per unit = RM 894.45.

At any point in time before maturity, the same principle is applied for the determination of the price of a unit of *ṣukūk*.

Even though, for this example, the tenor is short (five years), the *ṣukūk mushārakah* would also be suitable for a venture of longer term.

V. CONCLUSION

In this paper we have developed an innovative model of *ṣukūk* for companies. The model is based on the *mushārakah* concept and has an incentive-compatible feature to address the potential agency problem, by making the share of the issuing company in the profit positively related to its performance. To measure the performance of the firm, the sector ROE adjusted with the company beta is considered in order to take into account the riskiness level of the firm. The benchmarking against the sector ROE is justified on the ground that the *mushārakah ṣukūk*-holders face similar risk to that of the equity-holders; therefore, they should rightly expect similar return. Thus, the profit-sharing ratio is variable in such a way that, when the firm's return to the capital is equal to the benchmark (the firm beta times the sector ROE), then the equity-holders and the *ṣukūk*-holders will have equal return. When the firm's return to capital is higher than the

benchmark, the equity-holders will be 'rewarded' with higher return (as compared to *ṣukūk*-holders). Conversely, when the firm's return to capital is lower than the benchmark, the equity-holders' return will be lower than that of the *ṣukūk*-holders. On the other hand, they bear loss proportionately to their capital contribution. To further address the agency problem, the convertibility of the *sukūk* into common shares is suggested upon the occurrence of some events that the contracting parties may determine. The theoretical properties of the model are validated using two types of simulations: Monte Carlo Simulation and backtesting.

The proposed model of *ṣukūk mushārakah* allows the *ṣukūk*-holders to invest in a tradable and Sharī'ah-compliant instrument that yields a return higher than what they usually get from the current *ṣukūk* in the market. With its innovative design, the proposed model constitutes a new class of financial security with respect to the residual nature of the claim and its limited tenor. It thus presents an opportunity for diversification. The model also means higher risk for the investor as neither the profit nor the capital is guaranteed. It resembles common stock in that respect.

For the companies, the model constitutes a new Sharī'ah-compliant instrument to mobilize funds in the capital market. The model would mean for them higher financial cost–as compared to debt instruments–but it would imply at the same time lower probability of bankruptcy, since the *ṣukūk* are equity-based instruments. It is clear that the *ṣukūk* would be a good alternative for those companies which are willing to issue new stocks but are concerned about their dilution effect. Indeed, based on the pecking order theory, companies preferably finance their new investments with internal funds, and then by new issues of debt and finally by new issues of equity (Brealey, Myers and Allen, 2008: 517). Thus, with the proposed *ṣukūk mushārakah*, the companies would have a new option to raise funds that is between debt and equity. However, to prevent the moral hazard that can arise when an issuing firm undertakes projects with low returns in the early years, the option of convertibility of the *ṣukūk* should be considered. However, we have not delved into the determination of the redemption price of the *ṣukūk* in case of conversion. Further study is needed to address this limitation.

Ṣukūk mushārakah can also be used by companies not yet listed to fund their operations or to finance infrastructure projects that generate revenue. This would be pertinent particularly in a Public-Private-Partnership (PPP) framework. The PPP has been increasingly employed for developing infrastructure projects all over the world

during the last two decades. The related literature has identified many advantages of the PPP concept in terms of risk sharing among the partners and increased efficiency in the allocation of the resources and the delivery of the services. Indeed, there are inherent risks involved in the construction of infrastructure, or its operation and maintenance, or its financing. Through the PPP, some of these risks, usually assumed by the government alone, are shared with private entities. Since, in most cases, return to the latter is linked to the availability of revenues from the infrastructure, the private entity has incentives to deliver the service in a cost-effective way with all the required discipline and competencies (Hammami, Ruhashyankiko, and Yehoue, 2006; Engel, Fisher, and Galetovic, 2008).

References

Adam, N. (2005). Sukuk: A Panacea for Convergence and Capital Market Development in the OIC Countries. *Compiled papers presented at the 6th International Conference on Islamic Economics and Banking in 21st Century, Jakarta, Indonesia, 21-24th November 2005.*

Ahmad, H. (2002). Incentive-Compatible Profit Sharing Contracts: A Theoretical Treatment. In Iqbal, M. and Llewellyn, D. T. (Eds). *Islamic Banking and Finance: New Perspectives in Profit Sharing and Risk*. pp. 40-54. Edward Elgar Publishers.

Al-Amine, M. A. (2008). Sukuk Market: Innovations and Challenges. In Ali, S. S. (Ed). *Islamic Capital Markets: Products, Regulation and Development.* pp. 33 - 54. Jeddah: IRTI.

Al-Suwailem, S. (2006). *Hedging in Islamic Finance*. Jeddah: IRTI.

Al-Zuhayli, W. (2003). *Financial Transactions in Islamic Jurisprudence.* El-Gamal, M. (Translated). Damas*:* Dar El Fikr.

Ali, S. S. (2008). Islamic Capital Markets: Current State and Developmental Challenges. In Ali, S. S. (Ed). *Islamic Capital Markets: Products, Regulation and Development.* pp. 1 - 19. Jeddah: IRTI.

Bancel, F. and Mittoo, U. R. (2004). Why European Firms Issue Convertible Debt? *European Financial Management Journal.* 10(2), 339–373.

Basel Committee on Banking Supervision (1996). *Supervisory Framework for the Use of 'Backtesting' in Conjunction with the Internal Models Approach to Market Risk Capital Requirement.* Basel Committee Publications: Bank for International Settlements.

Bender, E. A. (2000). *An Introduction to Mathematical Modeling*. New York: Dover Publication.

Bodie, Z., Kane, A. and Marcus, A. (2009). *Investments*. 8th Edition. New York: McGraw – Hill Companies, Inc.

Brealey, R., Myers, S. and Allen, F. (2008). *Principles of Corporate Finance.* MC Graw Hill International Edition.

Brennan, M. and Schwartz, E. (1988). The Case for Convertibles. *Journal of Applied Corporate Finance*. 1, pp. 55-64.

Christoffersen, P. (2008). Backtesting. In Cont, R. (Ed.). *Encyclopedia of Quantitative Finance.* John Wiley & Sons Ltd.

Dallah al-Baraka. *Fatawa Iqtisadiyaah*. Retrieved on 10 August, 2011 at http://shamela.ws/index.php/main.

Diaw, A. and Boon Ka, A. (2010). *Maqāsid* al-Shariah in Transactions: a *Maqāsidi* Analysis of the Risk Management Strategies and Instruments. Paper presented at the *fourth conference on Islamic banking and finance: risk management, regulation and supervision, Sudan.*

Engel, E., Fisher, R. and Galetovic, A. (2008). The Basic Public Finance of Public-Private Partnership. *Economic Department working paper* No. 35. Department of Economics Yale University.

Fabozzi, F. J. and Modigliani, F. (2009). *Capital Markets Institutions and Instruments*. 4th Edition. New Jersey: Pearson Education.

Global Islamic Finance Forum (GIFF) (2010). *Islamic Finance Opportunities: Country and Business Guide.* Malaysia: KFH Research Ltd.

Hammami, M., Ruhashyankiko, J. F. and Yehoue, E. B. (2006). *Determinants of Public-Private Partnership in Infrastructure.* Working Paper No. 06/99. IMF.

Haneef, R. (2009). From "Asset-backed" to "Asset-light": The Intricate History of Sukuk. *ISRA International Journal of Islamic Finance.* Vol. 1, Issue 1.

Hasan, Z. (2002). Mudarabah as a Mode of Financing in Islamic Banking: Theory, Practice, and Problems. *Middle East Business and Economic Review.* Vol.14, No.2.

IIFM (2009). *Sukuk Report: A Comprehensive Study of the International Sukuk Market*. Bahrain: International Islamic Financial Market.

Iqbal, Z. and Mirakhor, A. (2007). *Introduction to Islamic finance: Theory & Practice.* Singapore: John Wiley & Sons.

Keynes, J. M. (1936). *The General Theory of Employment, Interest and Money.* Electronic version available at http://gutenberg.net.au/ebooks03/0300071h/printall.htmlaccessed

Lehikoinen, K. (2007). *Development of Systematic Backtesting Processes of Value-At-Risk.* Master Thesis: Helsinki University of Technology.

Loncarski, I., Horst, J. T. and Veld, C. (2006). Why Do Companies Issue Convertible Bonds? A Review of Theory and Empirical Evidence. In Renneboog, L. D. R. (Ed.): *Advances in Corporate Finance and Asset Pricing.* Amsterdam: Elsevier.

Mansuri, M. T. (2006). *Islamic Law of Contracts and Business Transactions*. New Delhi: Adam Publishers & Distributors.

McLeish, D. (2005). *Monte Carlo Simulation and Finance*. New Jersey: John Wiley & Sons.

Nisar, S. (2007). *Islamic Bonds (Sukuk): Its Introduction and Application*. Accessed on 8 August, 2011 at www.financeislamic.com

Obaidullah, M. (2005). *Islamic financial services*. Jeddah: King Abdul Aziz University.

Obiyatulla, B. (1997). Adapting Mudarabah Financing to Contemporary Realities: A Proposed Financing Structure. *The Journal of Accounting, Commerce & Finance.* Vol. 1, No.1.

Oh, I. L., Hwang, J., Heshmati, S. A. (2009). *Analysis of Product Efficiency in the Korean Automobile Market from a Consumer's Perspective*. Springer.

Raychaudhuri, S. (2008). Introduction to Monte Carlo Simulation. Paper presented at the Winter Simulation Conference. *Eds. Mason, S. J. Hill, R. R., Monch, L., Rose, O., Jefferson, T. and Fowler, J. W.*

Sidiqqi, M. N. (2006). Islamic Banking and Finance Theory and Practice: Survey of State of Art in Islamic Banking & Finance. *Islamic Economics Studies*. Vol. 13, No. 2.

Standard & Poor (2009). *Islamic Finance Outlook 2009*.

Tariq, A. A. and Dar, H. (2007). Risks of Sukuk Structures: Implications for Resources Mobilization. *Thunderbird International Business Review*. Vol. 49 (2), 203–223.

Usmani, M.T. (1999). *An Introduction to Islamic Finance*. Kluwer Law International.

Usmani, T. (2007). *Sukuk and their Contemporary Applications*. Accessed on 10 August, 2011 at http://www.muftitaqiusmani.com/index.php?option=com_content&view=article&id=3:sukuk-and-their-contemporary-applications&catid=12:economics&Itemid=15

Arabic References

[1] بحوث ندوة (الصكوك الإسلامية: عرض و تقويم) المنعقدة في جدة 11-10 جمادى الآخرة 1431 هـ , الموافق 24 – 25 مايو 2010 م، بالتعاون بين مركز أبحاث الإقتصاد الإسلامي و مجمع الفقه الإسلامي الدولي التابع لمنظمة المؤتمر الإسلامي، والمعهد الإسلامي للبحوث والتدريب عضو مجموعة البنك الإسلامي للتنمية.

[2] نزيه كمال حماد، المشاركة المتناقصة و أحكامها في ضوء العقود المستجدة. مجلة مجمع الفقه الإسلامي بجدة، ع. 13, 2001.

APPENDICES

APPENDIX 1: PROOF FOR THE ADDITIONAL CONDITION ON λ

Additional conditions for $f(K,\beta,ROE_i,P) = \frac{Log(K\times\beta\times ROE_i)}{Log((1-T)\times P)}$.

To avoid negative value on the numerator or the denominator we impose the following conditions:

$$\begin{cases} Log(K\times\beta\times ROE_i) > 0 \\ Log\big((1-T)\times P\big) > 0 \end{cases}$$

$$\begin{cases} Log(K\times\beta\times ROE_i) > Log1 \\ Log\big((1-T)\times P\big) > Log1 \end{cases}$$

$$0 < \lambda < 1 \quad this\ true\ for \begin{cases} (K\times\beta\times ROE_i) > 1 \\ \big((1-T)\times P\big) > 1 \end{cases}$$

$$and\ \frac{K_s}{K} \times \frac{Log(K\times\beta\times ROE_i)}{Log((1-T)\times P)} < 1$$

$$\frac{K_s}{K} \times \frac{Log(K \times \beta \times ROE_i)}{Log\big((1-T) \times P\big)} < 1$$

$$\Leftrightarrow \frac{K_s}{K} \times Log(K \times \beta \times ROE_i) < Log\big((1-T) \times P\big)$$

$$\Leftrightarrow Log(K \times \beta \times ROE_i)^{\frac{K_s}{K}} < Log\big((1-T) \times P\big)$$

$$\Leftrightarrow P > \frac{(K \times \beta \times ROE_i)^{\frac{K_s}{K}}}{(1-T)}$$

APPENDIX 2: RESULTS OF THE BACKTEST FOR THE FIVE SELECTED COMPANIES OVER THE PERIOD 2005 – 2009

Results for Bina Darulaman Bhd.

Year	ROE (%)	Benchmark * (%)	K*β*ROE	Lambda	Return to Sukuk (%)	Return to Eq1** (%)	Return to eq2 (%)
2005	11.88	5.85	9.99	0.01	6.46	6.95	9.06
2006	14.69	9.70	17.48	0.05	6.14	4.42	5.81
2007	14.72	12.85	28.03	0.22	8.11	6.08	8.40
2008	10.64	12.94	34.15	0.32	8.91	7.06	10.15
2009	11.84	17.42	54.50	0.45	8.76	5.54	8.58
Average	12.75	11.75	28.83	0.21	7.68	6.01	8.40
Std Dev.					1.16	0.97	1.43

Results for Kwantas

Year	ROE (%)	Benchmark (%)	K*β*ROE	Lambda	Return to Sukuk (%)	Return to Eq1 (%)	Return to eq2 (%)
2005	12.59	9.70	54.26	0.20	8.46	7.98	10.96
2006	23.92	15.50	108.58	0.44	5.20	2.86	4.39
2007	24.68	13.62	119.93	0.22	11.84	11.28	15.62
2008	16.62	14.63	148.82	0.14	17.08	17.85	24.04
2009	12.67	10.32	107.93	0.08	-6.23	-6.23	-6.23
Average	18.09	12.75	107.91	0.22	7.27	6.75	9.76
Std Dev.					**7.81**	**8.11**	**10.24**

* The benchmark is the product: $\boldsymbol{\beta}$ ***ROE**.
**Eq1 refers to the case where the Sukuk are not tax deductible whereas eq2 refers to the case where they are.

Results for Nestlé

	ROE (%)	Benchmark (%)	K*β*ROE	Lambda	Return to Sukuk (%)	Return to Eq1 (%)	Return to eq2 (%)
2005	36.62	4.81	30.25	0.10	24.39	42.44	56.63
2006	40.94	5.98	39.85	0.11	26.51	42.86	57.24
2007	42.23	11.96	76.84	0.01	35.43	46.61	60.68
2008	45.44	89.29	462.92	0.01	69.68	66.29	86.28
2009	42.81	25.05	224.26	0.34	35.76	40.28	58.56
Average	41.61	27.42	166.82	0.11	38.36	47.69	63.88
Std Dev.					16.32	9.52	11.29

Results for Sime Darby

	ROE (%)	Benchmark (%)	K*β*ROE	Lambda	Return to Sukuk (%)	Return to Eq1 (%)	Return to eq2 (%)
2005	12.59	12.95	1429.00	0.18	9.63	9.08	12.39
2006	23.92	22.92	2722.14	0.20	10.79	9.35	12.84
2007	24.68	30.05	3843.55	0.15	12.84	11.09	15.00
2008	16.62	20.08	5100.37	0.13	15.51	14.90	20.03
2009	12.67	15.50	3723.76	0.09	10.42	9.79	13.01
Average	18.09	20.30	3363.76	0.15	11.84	10.84	14.65
Std Dev.					2.12	2.14	2.84

Results for Tenaga Nasional

	ROE (%)	Benchmark (%)	K*β*ROE	Lambda	Return to Sukuk (%)	Return to Eq1 (%)	Return to eq2 (%)
2005	10.43	6.91	2984.95	0.65	5.41	4.91	9.09
2006	12.25	9.73	4293.39	0.59	6.79	6.04	10.41
2007	13.50	11.56	5325.67	0.49	9.08	8.52	13.56
2008	10.85	9.29	4407.76	0.48	6.34	5.73	9.05
2009	10.57	9.22	4378.09	0.48	6.18	5.56	8.76
Average	11.52	9.34	4277.97	0.54	6.76	6.15	10.17
Std Dev.					1.24	1.24	1.79

(Footnotes)
1 Return to eq1 represents the case where the sukūk are not tax deductible.
2 Return to eq2 represents the case where the sukūk are tax deductible.