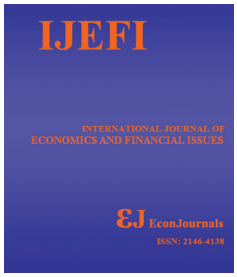

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Sukuk Market and Economic Welfare Nexus: A Partial Equilibrium Approach

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ABSTRACT

Due to its distinctive features and investment quality, sukuk as an Islamic alternative to bond financing, have known last decades a worldwide interest and a rapid widespread, particularly after the 2007-2008 global financial crisis. Despite the global market prevalence of sukuk, the literature on the sukuk – economic wealth nexus still inexistant. In this study, we develop a basic model that captures the welfare effects of sukuk markets. The main finding shows the importance of a well-developed sukuk market in hedging interest rate and inflation risks effectively and, thereby improving investor welfare.

Keywords: Sukuk, Economic Welfare, Partial Equilibrium
JEL Classifications: D53, G15, D60

1. INTRODUCTION

Over the last two decades, private capital markets (PCMs) have known increasing recognition in allocating capital, achieving productivity, and providing adequate managerial incentives, thereby leading many emerging economies to develop their stock markets. However, theoretically developing PCMs presupposes the existence of private savings despite that individuals are not well cultivated and lack the experience required in managing their own savings (Bernheim, 1996). Empirically, Benartzi (2001) proves the systematic errors in the savings' investment decisions. Besides, Brennan and Torous (1999) have shown that decision errors may have only second-best importance for investors welfare, given the set of available investment opportunities, and assuming that individuals are imperfectly rational.

To evaluate the welfare gains of an investor due to the availability of sukuk market, it is necessary to analyze the return of optimal dynamic investment strategies of investors in a long-term horizon under different assumptions about the availability of sukuk.

Some works seem to approach the problem from the perspective of portfolio management strategies of long-horizon investors and have emphasized optimal allocations between stock and cash without addressing the role of long-term bonds. More recent works have analyzed the demand for long-term bonds when interest rates are stochastic (Brennan et al., 1997, Campbell and Viceira, 2001, Brennan and Xia 2000-2002, Xia, 2002, Wachter, 2003, Sangvinatsos and Wachter 2005, Liu, 2007, Gonzalo and Olmo, 2016).

To the best of the author's knowledge, no work has considered the welfare benefits (costs) of the presence (absence) of sukuk market. In this paper we are interested by the effects on investor welfare of an available wide range of securities, assuming that investors' decisions are made rationally. Specifically, we aim to show the role of sukuk in improving investors' welfare.

Sukuk are financial instruments sharing characteristics with stocks and bonds. They are issued to finance the acquisition or the production of tangible assets (Godlewski et al., 2013). So, rather

than asset-backed, sukuk are asset-based. Empirical literature on the differences between sukuk and conventional bonds is divided in two groups. While the first one considers that sukuk are alternative investment outlets (Godlewski et al., 2011), the second group however show that, sukuk have significantly higher returns than conventional bonds (Godlewski et al., 2013, Fathurahman and Fitriati, 2013, Klein and Weill, 2016), mainly with the roles they played in reducing information gathering costs between issuers and investors subsequent to increasing sukuk issuances due to sukuk market development (SMD).

According to Cakir and Raei (2007) sukuk are essentially less risky than sovereign bonds. Examining a comparing the VaR of hybrid portfolio composed of several sukuk and Eurobond contracts to that containing only Eurobonds, the authors show that, when added sukuk reduce the overall portfolio risks.

From another side, Ross et al. (2012) showed that, even when Sukuk and bonds are fundamentally different, they are exposed to the same risk and consequently have the same reaction to the market's sentiments. An increase in inflation rate leads to an increase in nominal interest rate in order to compensate the real interest rates. Also, when inflation rises, bond and sukuk yields move in the same direction to maintain intact the purchasing power.

The above developments provide insights that factors affecting bonds affect by the same forces sukuk. Fluctuations of inflation and interest rates will affect the coupon of the bonds, and in turn affect sukuk prices especially when assuming that they are not hold until maturity, with the possibility of losing the face value when they are sold on the secondary market.

While analysis of the welfare effects of the introduction of sukuk would require a general equilibrium model and would consider the effects of introducing new assets on the equilibrium return rates on existing assets, we adopt in this paper a simpler partial equilibrium model to approximate the effect of investment opportunities on the welfare of a small investor taking the return rates on all assets as given and unchanged following the introduction of new assets.

These assumptions, although restrictive, allow us to develop a simple model to study the effect of available investment opportunities on the welfare of a small investor. The indirect utility function of an investor under different assumptions will then be considered; this will allow us to assess the importance of the sukuk market by comparing the optimal dynamic portfolio strategies and their corresponding certainty equivalent wealth () for investors having, or not, the opportunity to invest in sukuk securities.

We consider the case of an economy that allows investing in cash, bonds, and a set of two sukuk securities with maturities ranging from zero to . In an economy with both bond and sukuk markets, the investor optimum can be achieved by investing in cash, bond and sukuk securities of different maturities. All these four assets provide a perfect hedge against the risks associated with inflation and interest rates.

Moreover, we consider the optimal welfare of investors in an economy with no sukuk market or with only an underdeveloped one, respectively. The investor's optimization problem is solved using the dynamic programming method. In the first paragraph we present the general framework; then, in the second paragraph we expose the problem in the absence of sukuk market. Finally, in the third paragraph we expose the problem when the investor faces a limited sukuk market.

The rest of the paper is organized as follows. Section 2 presents the general framework. Section 3 exposes the optimal allocation problem in the absence of sukuk market. Section 4 however, is concerned with the optimal allocation problem in the presence of a nascent sukuk market. Finally, section 5 concludes the paper.

2. THE GENERAL FRAMEWORK

The general framework of our study is inspired by that of Xia (2001) which studies the effects on investors welfare of a set of securities.

Assuming that investors make rational decisions, the aim of this paper consists at determining the role of sukuk in portfolio investment over a long horizon. We consider, for this purpose, the optimization portfolio problem of a representative investor with an iso-elastic utility function, and which's concerned by maximizing the expected utility of real wealth at time t:

$$\begin{cases} \max \; E_t\left(\dfrac{(W_T/\Pi_T)^{1-\gamma}}{1-\gamma}\right) \\ s/t \quad \dfrac{dW}{W} = (R_f + x'\Lambda)dt + x'\sigma dz \qquad (W>0) \end{cases} \tag{1}$$

where T is the investment horizon, and γ is the coefficient of relative risk aversion. The inflation rate Π is locally stochastic. R_f is the instantaneous nominal risk-free interest rate. Λ is a vector composed by the nominal risk premiums of the stock (ST) and the two sukuk securities (S) with maturities T_1 and T_2.

$$\wedge \equiv \begin{bmatrix} \sigma_{ST}\lambda_{ST}, -ST(t,T_1)\lambda_r - S(t,T_1)\lambda_\pi, \\ -ST(t,T_2)\lambda_r - S(t,T_2)\lambda_\pi \end{bmatrix}' \tag{2}$$

The constraint presented in the maximisation program in the equations system (1) defines the dynamics of the nominal wealth process. Note that the nominal risk premium on sukuk securities depends only on their exposures to innovations in expected inflation and real interest rates (dz_r) and (dz_ϖ).

Solving the investor's maximization problem by dynamic programming allows us to determine the vector of optimal allocations $x^* = (x^*_{ST}, x^*_{S_1}, x^*_{S_2})'$ and, beyond that, the CEW[1]. The CEW is the certain amount of money obtained at the horizon in

1 This phenomenon is very well-known in the economic literature as the Fisher effect.

exchange for one unit of current wealth today and the opportunity to invest until the horizon. Similarly, the certainty equivalent return (*CER*) is the less risky return required on a monetary unit of initial investment for the investor to be indifferent between the payoff from this less risky rate and the opportunity to invest in all available assets.

The optimal allocation of wealth to the stock (*ST*) and the two nominal sukuk securities (S_1 and S_2) is described by the following equation:

$$x^* \equiv \begin{bmatrix} x^*_{ST} \\ x^*_{S_1} \\ x^*_{S_2} \end{bmatrix} = \frac{1}{\gamma}(\sigma')^{-1} \begin{bmatrix} \rho^{-1} \begin{pmatrix} \lambda_{ST} \\ \lambda_r \\ \lambda_\pi \end{pmatrix} + \begin{pmatrix} 0 \\ (1-\gamma)B(t,T)\sigma_r \\ 0 \end{pmatrix} \\ +(\gamma-1) \begin{pmatrix} \xi_{ST} \\ \xi_r \\ \xi_\pi \end{pmatrix} \end{bmatrix} \quad (3)$$

Due to the availability of sukuk securities that the investor can use in hedging the stochastic investment opportunity set, the demand for sukuk is independent of the stochastic interest rate process or the investment horizon. If the investor can invest only in cash and stock, the optimal allocation to stock will depend on the time horizon and includes a term related to hedging the stochastic interest rate.

The *CEW* is given by the following expression:

$$CEW^* = \exp\{B(t,T)r_t + d(t,T)\} \quad (4)$$

Likewise, the *CER* is such that:

$$CER^* = \frac{LnCEW^*}{(T-t)} = \frac{B(t,T)}{T-t}r_t + \frac{d(t,T)}{T-t} \quad (5)$$

The equations (4) and (5) imply that, as long as $B(t,T)>0$[2], the *CEW* and the *CER* increase with the real interest rate,, measuring the preference for future investment opportunities.

3. OPTIMAL ALLOCATION IN THE ABSENCE OF SUKUK MARKET

If the investor can invest only in cash and stock, the optimal allocation to stock equity x^*_{ST} is given by:

$$x^*_{ST} = \frac{1}{\gamma\sigma^2_{ST}}\left[\sigma_{ST}\lambda_{ST} + (1-\gamma)B(t,T)\sigma_{STr} - (1-\gamma)\sigma_{ST\pi}\right]$$

where σ_{STr} ($\sigma_{ST}{}^{\pi}$) are the covariances between the stock return and the real interest rate r (realized inflation π).

Let CEW^{NS} denote the *CEW* of the investor who does not invest in sukuk (*NS*). The ratio of the *CEW* of such an investor to that of an investor with full access to both stock and sukuk markets is as follows:

$$CEWR_1 = \frac{CEW^{NS}}{CEW^*} = \exp\left\{\begin{matrix} -\frac{1}{2\gamma}h(t,T,dz) \\ {}'(\mathrm{I}-e_1e_1'\rho)h(t,T,dz) \end{matrix}\right\} < 1 \quad \forall\gamma>0 \quad (6)$$

Equation (6) implies that the investor utility can be improved by further developing sukuk market. The welfare loss, as measured by the ratio of the *CEWs* (*CEWR*), does not depend on the state of the economy or the volatility of expected inflation, but on the volatility of unexpected inflation. Thus, in economies without sukuk market, it is the volatility of unexpected inflation that matters rather than the inflation.

The difference between the *CERs* with and without sukuk market is:

$$CERD_1 = \frac{Ln\,CEW^S - Ln\,CEW^*}{T-t} = -\frac{1}{2\gamma(T-t)}$$
$$h(t,T,dz)'(\mathrm{I}-e_1e_1'\rho)h(t,T,dz) < 0 \quad \forall\gamma>0$$

In summary, the welfare loss arises mainly from two sources: the less-efficient optimal mean-variance portfolio due to the fewer available securities, and the less-efficient portfolio hedging due to the imperfectly correlation of stock return with *r* and Π.

4. OPTIMAL ALLOCATION IN THE PRESENCE OF NASCENT SUKUK MARKET

The final step consists at assuming the existence of a nascent sukuk market (embryonic or underdeveloped), so that the investor can only invest in a single sukuk security of maturity (T_1–t) in addition to cash and stock.

The optimal proportion of wealth invested in each asset is:

$$x^*_{ST,S_1} = \frac{1}{\gamma}\hat{\Omega}^{-1}\left[\begin{pmatrix} \sigma_{ST}\lambda_{ST} \\ \sigma_{S_1}\lambda_{S_1} \end{pmatrix} + (1-\gamma)B(t,T)\begin{pmatrix} \sigma_{rST} \\ \sigma_{rS_1} \end{pmatrix} - (1-\gamma)\begin{pmatrix} \sigma_{ÐST} \\ \sigma_{ÐS_1} \end{pmatrix}\right]$$

where σS_1 λS_1 is the sukuk risk premium[3], and $\hat{\Omega}$ is the variance-covariance matrix of stock and sukuk returns.

Since the investor cannot perfectly hedge his entire investment using only a single sukuk and cash, stock also provides an additional hedging service. The demand for stock to hedge real interest rate risk is given by the following expression:

$$ST^d = \frac{1-\gamma}{\gamma}\frac{\sigma^2_{S_1}\sigma_{rST} - \sigma_{STS_1}\sigma_{rS_1}}{\sigma^2_{ST}\sigma^2_{S_1}(1-\rho^2_{S_1ST})}B(t,T)$$

2 Note that $B(t,T) = \frac{1-e^{-\kappa(T-t)}}{\kappa}$, where k the mean reversion coefficient, is known constant.

3 Theoretically, two common risk factors for sukuk need risk premium: market risk (interest rate and inflation risks), and information asymmetry risk (Uddin et al., 2020)

where $\sigma_r S_1$ is the covariance between the available sukuk return and the state variable r. ρ_{STS} is the correlation coefficient between stock and sukuk returns. The importance of this hedging demand depends not only on the covariance between sukuk return and r but also on $\sigma_r S_1$.

The ratio of the *CEW* of an investor operating in an underdeveloped sukuk market ($CEW^{ST,S1}$) to that realized in an optimal market (*CEW**) is given by the following expression:

$$EWR_2 = \frac{CEW^{ST,S_1}}{CEW^*} = \exp\left\{\begin{array}{l} -\frac{1}{2\gamma}h(t,T,dz) \\ '[I-\omega'(\omega\rho\omega')^{-1}\omega\rho]h(t,T,dz) \end{array}\right\} < 1 \quad (7)$$

Regarding the *CER*, the deviation from the optimal situation *CERD* is:

$$CERD_2 \equiv \frac{LnCEW^{ST,S_1} - LnCEW^*}{T-t} = -\frac{1}{2\gamma(T-t)} \quad (8)$$
$$h(t,T,dz)'[I-\omega'(\omega\rho\omega')^{-1}\omega\rho]h(t,T,dz) < 0$$

Expressions (7) and (8) show that limiting the investor only to a simple sukuk security reduces his welfare (*CEW* or *CER*). The welfare loss is again due to the inadequate hedging tool available to the investor. Thus, developing a robust and well-functioning sukuk market helps investors to hedge interest rate and inflation risks effectively and, thereby improving their welfare.

All in all, the simple partial equilibrium analysis showed that the availability of sukuk can have a very significant effect on improving investor welfare. This points to the need and value of developing sukuk markets in economies where they do not already exist.

5. CONCLUSION

The aim of this paper was to demonstrate the importance of a well-developed sukuk market in improving economic welfare. The most important result is the magnitude of the investor's welfare loss from the absence of sukuk market, which appears to increase with the investment horizon and the volatility of the real interest rate and the unexpected inflation rate. Developing a robust and well-functioning sukuk market helps hedging effectively interest rate and inflation risks and, accordingly improving investors welfare.

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