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# Determinants of International Sukuk Issuance and Capacity Estimation for Iranian Financial Market

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## Abstract

*The Sukuk market has become the fastest growing segment of the Islamic financial services industry. Governments and other corporate entities have started tapping the local and international Sukuk markets in order to raise the required funds. The investor base is also expanding and Sukuk has now become a popular and obvious choice for retail investors in a number of jurisdictions. However, because of lack of suitable market conditions and some cross-border restrictions, the international Sukuk market is not developed enough in Iran. Using international Sukuk issuance data for 2001–2015, this study investigates the determinants of international Sukuk issuance and the capacity of issuing such securities in Iranian financial market. We use ANOVA analysis and PCA to explore main factors. Using the data of 34 indicators for 21 countries that have issued international Sukuk, we found that the main determinants of international Sukuk issuance are the ratios of bank deposits to GDP (%), Stock market capitalization to GDP (%), International debt issues to GDP (%) and outstanding international public debt securities to GDP (%). After determination of the basic factors for the countries, using the discriminant model, we estimated the Iranian financial market's capacity for issuing international Sukuk.*

***Keywords**: Islamic finance, International sukuk, Sukuk issuance, Iranian financial market.*
***JEL Classification**: G15, G23, E27, C21*

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# 1. Introduction

The Islamic finance industry is a component of a broader financial system in which the design and operation of financial instruments, institutions, markets, and infrastructure are based, where relevant, on contracts and governance arrangements which apply Shariah rules and principles (Sundararajan, Ahmed, & Kohli, 2011, p. 3). In recent years, financial activities conducted under the banner of "Islamic finance" have grown significantly in volume and scope, attracting significant attention worldwide.

The Islamic capital market is an important component of the overall Islamic finance system although it has been a late entrant into the industry, starting only in the mid-1990s. Notably, the sector has picked up positive momentum and is now attracting diverse investors and issuers from around the world growing steadily in depth and size. Broadly, Islamic capital markets comprise three main sectors: The Islamic equities market facilitated by the availability of Shariah-compliant indices, The *Sukuk*, and the Islamic funds market (IFSB, 2015, p. 17).

The *Sukuk* market has become the fastest growing segment of the Islamic financial services industry. It has clearly emerged as a key capital market instrument used by issuers ranging from sovereigns, quasi-sovereigns, financial institutions and corporates for project financing and infrastructure purposes etc. The government and other corporate entities have started tapping the local and international *Sukuk* markets in order to raise the required funds. The investor base is also expanding and *Sukuk* has become a popular and obvious choice for retail investors in a number of jurisdictions. *Sukuk* is considered to be the most appealing component of the activities constituting Islamic finance in general (IIFM, 2016; IFSB, 2015, p. 8).

With a history of more than half a century of activities, the Iranian Islamic capital market is one of the fast-growing markets gaining momentum after the ratification of the Securities Market Act and the issuance of general policies regarding privatization stipulated in the Constitution. As a result of this policy boost, the total value of the market has increased by 40 times in the past decade. Furthermore, the introduction of *Sukuk* has led to a diversity of instruments and a continuous expansion of investment in the market (Nili, 2014, p. 195). However, because of lack of market conditions and some cross-border restrictions, the international *Sukuk* market is not developed enough in Iran.

This paper first provides an analysis on determinants of international *Sukuk* issuance. Then it estimates the capacity of Iranian financial market for issuing international *Sukuk*. So we have two main questions to answer in this paper:

1. What factors influence the development of international *Sukuk* issuance?
2. How much is the capacity of Iranian capital market for issuing international *Sukuk*?

The rest of the paper is as follows. Section 2 explains the background of the matter. Section 3 examines the related literature. The main questions are explained in section 4. Section 5 describes the methodology including the model variables and data selected for this paper. The main results are presented in section 6. Section 7 includes our concluding remarks.

## 2. Backgrounds

### 2.1. International bond market

The ability to attract foreign participation in local currency bond market has important benefits for industrial and developing economies alike (Warnock & Warnock, 2005). At the other end of the spectrum are developing economies, which presumably have a greater need for foreign capital but are unfortunately unable to attract foreign investors to their local currency bonds. This inability to attract foreign investors has led to a reliance on foreign currency-denominated debt (Burger & Warnock, 2007; Eichengreen & Hausmann, 2005).

International bonds are government (sovereign) or corporate bonds issued in a country in a foreign currency to the investor (Arnold, 2015, p. 205). The international bond market has been much more innovative than the domestic bond market in the types of instruments offered to investors. This market encompasses two basic market segments: Foreign bonds and Eurobonds. A foreign bond issue is one offered by a foreign borrower to the investors in a national capital market and is denominated in that nation's currency. It is usually given a name that relates to the country of the currency of issue, e.g. Samurai bonds are issued in Japan in yen by a non-resident issuer. Eurobond issue is one denominated in a particular currency but sold to investors in national capital markets other than the country which issued the denominating currency. An example is a Dutch borrower issuing Dollar-denominated bonds

to investors in the U.K. (Eun & Resnick, 2004, p. 157; Arnold, 2015, p. 205). Different types of bonds are outlined in Table 1.

**Table 1. The Attributes of the Different Types of Bonds**

| Type of bond | Currency of issue | Nationality of issuer | Place of issue | Primary investors |
|---|---|---|---|---|
| **Domestic bond** | Domestic | Domestic | Domestic | Domestic |
| **Foreign bond** | Domestic | Foreign | Domestic | Domestic |
| **Eurobond** | Eurocurrency (*Euroyen Eurodollars, Eurosterling, etc.*) | Any | International | International |

*Source:* (Arnold, 2015, p. 206)

The majority of international bonds are issued in US Dollars or Euros, with the Euro now having overtaken the dollar – of all the international bonds outstanding 45% are denominated in Euros and 36% in Dollars (Arnold, 2015, p. 206). Bond issuance remained an important source of external financing for many low and middle-income countries, totaling $242 billion in 2014, up marginally from 2013 (World Bank, 2016, p. 7).

Eurobond segment of the international bond market accounts for approximately 80 percent of new offerings (Eun & Resnick, 2004, p. 165). Eurobonds present significant advantages to their issuers relative to domestic bonds. Table 2 lists the advantages and drawbacks of Eurobonds.

## 2.2. Sukuk

According to IFSB[1]'s definition, *Sukuk* are certificates that represent a proportional undivided ownership right in tangible assets, or a pool of tangible and other types of assets. These assets could be in a specific project or specific investment activity that is Shariah-compliant (IFSB, 2016).

Sukuk, which is plural for Sakk, refers to an investment certificate. It could also mean a trustee certificate. It seems that Sukuk were used extensively by Muslims in the middle Ages as papers denoting financial obligations from

1. Islamic Financial Services Board.

commercial activities. Some have argued that the contemporary term check has its origins in the word Sakk.

**Table 2. Advantages and Drawbacks of Eurobonds**

| Advantages | Drawbacks |
|---|---|
| Large loans for long periods are available. | Only for the largest companies and only those with good 'name recognition' or good credit rating |
| Often cheaper than domestic bonds. | More exchange rate risks |
| Ability to hedge interest rate and exchange rate risk. | The secondary market can be illiquid. |
| The bonds are usually unsecured. The limitations placed on management are less than those for a secured bond. | |
| The lower level of regulation allows greater innovation and tailor-made financial instruments. | |
| Issuance procedures are relatively simple | |
| Being outside the control of governments they cannot be frozen in an international dispute. | |
| Enhances the international profile of the borrower. | |

*Source:* (Arnold, 2015, p. 224)

Sukuk are also called Islamic bonds or Islamic securities, which structure securitized leases *(Ijarah)* and other Islamic financing contracts, such as *Murabahah* (sale with markup), *Musharakah* (a combination of equity contribution and proportional profit and loss sharing on the basis of partnership), and *Mudharabah* (partnership between one person who contributes capital and another who provides managerial skills) (Ismath Bacha & Mirakhor, 2013, p. 172; Zulkhibri, 2015, p. 238).

*Sukuk* securities are a subset of broader Islamic banking, investment, and finance products (Safari, Ariff, & Mohamad, 2014, p. 125). In fact, *Sukuk* consist of a specific class of shariah-compliant financial instruments which provide an alternative source of financing especially for the giant corporate and sovereign entities compared to the conventional bonds. *Sukuk* are innovative debt securities which are similar to the conventional bond with

respect to cash flow and risk (Klein & Weill, 2016, p. 2; Alam, Hassan, & Haque, 2013, p. 22). *Sukuk* serve as a vital tool for resource mobilization and a key instrument for the development of Islamic financial industry (Wilson, 2008; Jobst, Kunzel, Mills, & Sy, 2008).

The major distinguishing features of *Sukuk* compared to bonds are the prohibition of a fixed interest payment, the exclusion of transactions involving extreme uncertainty or a deliberate lack of transparency (harar), the exclusion of gambling (maysir), short selling, arbitrage and excessive speculation (Aloui et al., 2015a,b; Bouslama and Lahrichi, 2016). Moreover, the return on *Sukuk* should depend upon the return of the underlying investments that have to be compliant with Islamic rules. Hence, *Sukuk* should not be driven by interest rate changes in the same way as conventional bonds. Unlike bonds which constitute a nominal debt that the issuer has to re-pay at maturity, *Sukuk* represents a share in the project and its value at maturity has to reflect the current market value of the underlying investment (Maghyereh & Awartani, 2016, pp. 246-247).

**Table 3. *Sukuk* Variation by Different Criteria**

| Criteria | Types | |
|---|---|---|
| **Underlying Contract** | Mubadalah (transaction) Contracts | Ijarah, Wakalah, Salam, Murabahah, Istisna, Ju'alah, Bay'-al-Dayn |
| | participation (risk-sharing) Contracts | Musharakah, Mudharabah, Muzara'ah, Musaqah |
| | Non-profit | Qard-ul hassan, Vaqf (endowment) |
| | Hybrid | Two or more contracts |
| **Issuer Type** | Sovereign, Quasi-Sovereign, Corporate | |
| **Domicile** | Domestic, International | |
| **Maturity** | Short-term, Mid-term, Long-term | |
| **Profit rate** | Fix, Variable | |
| **Currency** | MYR, USD, SAR, BHD, GBP, etc. | |
| **Discourse** | Asset-backed, Asset-based | |
| **Marketability** | Tradable, Non-tradable | |
| **Listing** | Listed, Not-listed | |
| **Rating** | Rated, Not-rated | |

*Source:* Authors'

As all Islamic finance products and transactions must be based on a Shariah-compliant contract, *Sukuk* are typically designed on one or more such Shariah-based contracts (Ismath Bacha & Mirakhor, Islamic Capital Markets; a Comparative Approach, 2013, p. 176). Also, *Sukuk* have been classified according to different criteria like issuer type, domicile, maturity, currency, etc. Table 3 shows the different types of *Sukuk*.

The *Sukuk* market is seen as a way to channel the world's growing pool of Shariah-compliant capital to be used to promote sustainable and equitable economic development (Thomson Reuters Zawya, 2015). *Sukuk* serve as a vital tool for resource mobilization and a key instrument for the development of Islamic financial industry (Jobst, Kunzel, Mills, & Sy, 2008; Wilson, 2008). *Sukuk* have also become a significant tool for raising finance effectively and efficiently in term of the allocation and mobilization of resources on international capital markets (Zulkhibri, 2015, p. 237). Also *Sukuk* can be used in the strategic asset allocation and hedging of portfolio fund managers (Maghyereh & Awartani, 2016, p. 260). Furthermore, since global markets in many Muslim countries are largely untapped, *Sukuk* have a competitive advantage for international institutional investors (Zulkhibri, 2015, p. 242).

## 2.3. Sukuk market

The Islamic finance industry reached an overall total value of USD1.88 trillion in 2015 with expectations of market size to be $3.4 trillion by the end of 2018 (IFSB, 2016, p. 7) . An important sector of Islamic finance is comprised of *Sukuk*, which reached a global issuance level of about $767 billion by September 2015 (IIFM, 2016, p. 6).

The *Sukuk* sector is the fastest-growing segment of the global Islamic financial industry with a compound annual growth rate (CAGR) close to 20 percent between 2009 and 2014. The issuance of *Sukuk* has increased rapidly but there is still potential for further growth. Global *Sukuk* issuance totaled about US$114.5 billion in 2014 (Zulkhibri, 2015, p. 238). In the recent years, the market for *Sukuk* has grown fast from less than USD1,172 million in 2001 to USD137,599 billion in 2012 and slowed down to just over USD60,693 million issuances in 2015 (IIFM, 2016, p. 5).

Recently, many Muslim and non-Muslim countries have become interested in *Sukuk* as an alternative for finance and investment beyond conventional finance. Morocco, Nigeria and South Africa in Africa, France and the United Kingdom in Europe, Kazakhstan in Central Asia, and Brunei

in East Asia have modified their regulations to allow *Sukuk* to be issued in their financial markets, and many other countries are planning to do so. *Sukuk* are becoming an increasingly important Islamic financial instrument in both Muslim and non-Muslim countries (Zulkhibri, 2015, p. 237). The more exciting development of the *Sukuk* market is the acceptance of *Sukuk* outside the Muslim world as manifested by its issuance in non-OIC nations, namely, UK, Senegal, Hong Kong, South Africa, and Luxembourg (Ibrahim, 2015, p. 189).

Asian continues to be the dominant player in the global *Sukuk* market. In terms of region, Asia accounts for 74% of global *Sukuk* issuances since inception of the market. GCC is the second largest destination of *Sukuk* with 22% of global *Sukuk* issuance. Malaysia is the reason behind the dominance of Asia in the *Sukuk* market. The country has to its credit slightly over 67% of the total global *Sukuk* issuances until the end of 2015. Other issuers in order of their share in the global market are the UAE (8.1%), Saudi Arabia (7.8%), Indonesia (3.7%), Qatar (3.0%), Bahrain (2.76%) and Sudan (2.1%) (IIFM, 2016, p. 33).

The market for *Sukuk* has flourished, but Islamic financial markets are having difficulty in fully developing in many emerging Muslim countries because Islamic financial instruments are still limited with respect to conventional financial instruments (Zulkhibri, 2015, p. 238).

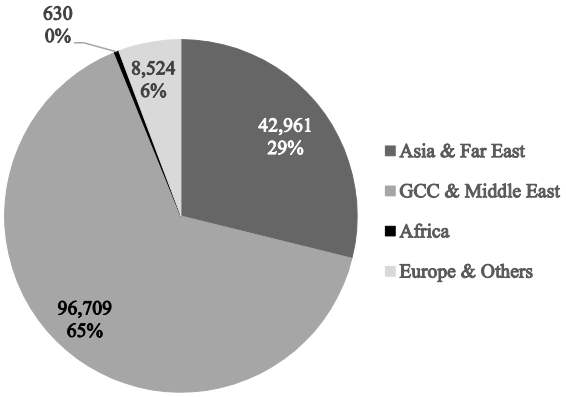
## 2.4. International Sukuk

Global *Sukuk* can be either domestic or international. According to above, we can say that international *Sukuk* are government (sovereign) or corporate *Sukuk* issued in a country or a foreign currency to the investor. The international *Sukuk* market is the key driver of the *Sukuk market* though it forms just under 20% of overall global *Sukuk* issuances since 2001. Denominated in USD and other stable currencies, international *Sukuk* are now being issued in longer tenors of up to 30 years. While in recent years, sovereign and quasi-sovereigns seem to be on the rise, historically since inception, roughly 47% of all international *Sukuk* issues have been in the corporate sector, which includes financial institutions, corporate and others (IIFM, 2016, p. 23).

Total international *Sukuk* issuances stood at USD20.88 billion in 2015 as against 2014 level of USD26.4 billion which was the highest ever value of issuances recorded since the inception of the *Sukuk* market. There have been

a total of 359 *Sukuk* issues worth USD148.8 billion between Jan 2001 to Dec 2015. UAE together with Saudi Arabia gained roughly over 50% of the entire international *Sukuk* issuances since inception (IIFM, 2016, p. 6). Figure 1 illustrates the regional break-up of the total international *Sukuk* issuance during the period Jan 2001– Dec 2015.

**Figure 1. Regional Break-Up of International *Sukuk* Issuance from Jan 2001 to Dec 2015 (USD millions)**




*Source:* (IIFM, 2016, pp. 23-24)

The share of sovereign/quasi-sovereign issuers in the international *Sukuk* market has risen steadily from only 28% of the entire issuance in 2001-2008 to 66% in 2013-2014. From the period 2013-2014 to the year 2015, however, we spot a marked shift from sovereign to quasi-sovereign with the latter forming 43% of the entire international issues in 2015 (IIFM, 2016, p. 18).

In the international *Sukuk* market, Ijarah *Sukuk* has traditionally been a more popular structure for issuance. The share of Ijarah among *Sukuk* issues consistently increased from 39% of total issuance in 2001-08, to 42% in 2013-14. In 2015 however, we see a sudden shift from Ijarah (14%) to Wakalah model (63%). USD13 billion or 63% of the total international *Sukuk* issuance in 2015 made use of the Wakalah model. On an overall basis, it seems that Ijarah *Sukuk* has historically been the favorite structure of international sovereign and corporate issuers while quasi-sovereign issuers seems to have favored the Wakalah structure (IIFM, 2016, pp. 28-30).

## 2.5. Sukuk issuance in Iran

Ratification of the Securities Market Act in 2005 provided the opportunity to design and employ *Sukuk* to be traded in Iran capital market as trading conventional bonds has been banned since the Islamic Revolution of Iran. Previously these instruments were mostly traded in the banking system in the form of money market but as of today different kinds of *Sukuk* in full compliance with Sharia laws are registered with SEO[1] and traded in the capital market. The first Musharakah *Sukuk* was issued in August 2005 and the annual issuance of *Sukuk* has experienced a promising upward trend ever since. To put this in perspective, *Sukuk* issuance in IFB[2] and TSE[3] recorded the value of $500 million in 2014 alone (SEO, 2014, p. 66).

Today along with common *Sukuk* traded on exchanges as Musharakah, Murabahah and Ijarah, there are others designed by market experts and ratified by Shariah committee to be used in the markets including Mudarabah, Manfa'ah and Istisna. The total amount of the *Sukuk* issuance from 2005 to the end of 2014 was USD1.6 billion. About 66% of this amount related to Ijarah and Murabahah *Sukuk* (SEO, 2014, p. 66). Table 4 shows the flow of finance through Iranian capital market during 2010-13.

Despite the relative development of the *Sukuk* market in Iran, most of the *Sukuk* issued in Iran have been domestic. Accordingly, one of the well potential markets in the Iranian financial market is international *Sukuk*. This paper attempts to estimate Iranian market capacity for issuing international *Sukuk* based on selected variables.

## 3. Related Literature

Compared to the literature on conventional bonds, the existing research on *Sukuk* is relatively thin, largely consisting of qualitative rather than quantitative work. The bulk of the literature focuses on operational matters of *Sukuk* issuance and structure in practice, which revolve around their need to be Shariah-compliant. However, empirical studies on economic factors impact on *Sukuk* market development and estimation of market capacity for issuing *Sukuk* are limited in numbers. There are few studies that look into the influence of changes in macroeconomic variables on *Sukuk* market.

1. Securities Exchange Organization.
2. Iran Fara Bourse.
3. Tehran Stock Exchange.

**Table 4. Financing in Iranian Capital Market (Billion Iranian Rials)**

| Description | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|
| Establishment of public joint stock companies | 3,268 | 1,413 | 2,555 | 1,500 |
| Capital raising in public joint stock companies | 95,431 | 98,324 | 113,950 | 189,927 |
| Musharakah *Sukuk* | 14,450 | 1,000 | 2,750 | 3,200 |
| New Islamic financial instruments | 291 | 3,416 | 2,639 | 8,137 |
| **Subtotal** | **113,440** | **104,153** | **122,894** | **202,764** |
| IPO in stock exchange and Farabourse market | 49,722 | 9,400 | 3,536 | 21,965 |
| Offering in Farabourse third market | 17,698 | 14,000 | 29,774 | 30,484 |
| Salam (forward) and deferred payment transactions in mercantile trade | 73,579 | 96,000 | 180,314 | 207,062 |
| Major & transfer transactions in stock exchange and Farabourse market | 66,823 | 65,032 | 62,780 | 197,844 |
| **Subtotal** | **207,822** | **184,432** | **276,404** | **457,355** |
| **Total** | **321,262** | **288,585** | **398,298** | **660,119** |

*Source*: (Nili, 2014, p. 206)

Cakir and Raei (2007) examine the risk-reduction advantages of issuing sovereign *Sukuk*. Using a sample of sovereign *Sukuk* and Eurobonds from the same issuer, they estimate and compare Value-at-Risk (VaR) for a portfolio that includes both instruments to a pure Eurobond portfolio. They found that the VaR is reduced when *Sukuk* are added to the portfolio of fixed-income securities, demonstrating that these investment certificates create diversification benefits for investors.

Jobst, Kunzel, Mills and Sy (2008) in their seminal paper summarize some of the issues encompassing the *Sukuk* market. They advocate that, despite the global financial crisis, there is still a strong demand from both Islamic countries and conventional financial institutions for Shariah compliant securities like *Sukuk.*

Mohd Ashhari, Chun and Nassir (2009) study the impact of *Sukuk* and conventional bonds announcement on shareholder wealth for firms listed on the Bursa Malaysia (stock market of Malaysia) for the period of 2001 to 2006. The study finds that there is a wealth effect on *Sukuk* issues announcement but not for conventional bond announcement.

Ahmad and Radzi (2011) investigate the role of prevailing economic conditions in the country on the issuance of *Sukuk* and conventional bond. The study finds significant effects of GDP, Malaysian Ringgit exchange rate with USD and market liquidity on the issuance of *Sukuk* in Malaysian capital market whereas conventional bonds issuance was only affected by exchange rate.

Ahmad, Daud, and Kefelia (2012) examined macroeconomic influences on *Sukuk* issuance in Malaysia based on aggregate level data Vector autoregressive model (VAR). The findings indicate that the causality runs from *Sukuk* to GDP. In the short-horizon, *Sukuk* is driven by its own dynamics. The study argues that since *Sukuk* issuance Granger-causes GDP, policy makers should introduce policies to modernize the functional aspects of Islamic capital market (Zulkhibri, 2015, p. 247).

Alam, Hassan, and Haque (2013) examine the impact of *Sukuk* and conventional bonds issuance announcement on shareholder wealth and their determinants using 79 *Sukuk* and 87 conventional bonds over 2004–2012 in six developed Islamic financial market. The study shows that from a short-run perspective, the effect of announcement of *Sukuk* on firm value is negative, while the effect of announcement of conventional bond is positive for all periods except for the post-crisis period. Therefore, in spite of having a religious motivation to issue *Sukuk*, the negative effect might hinder firms in raising funds for *Sukuk.*

Said and Grassa (2013) investigated similar issues on the determinants of *Sukuk* market development in ten countries. The results show macroeconomic factors-GDP per capita, Muslim population, economic size, and trade openness as well as regulatory quality-have a positive impact on the development of a *Sukuk* market. However, the amount of *Sukuk* issued has declined considerably in recent years, and the financial crisis has negatively affected the development of the *Sukuk* market. At the same time, conventional bond markets contribute positively to the development of the *Sukuk* market. It appears that the conventional bond market and the *Sukuk* market are complements rather than substitutes.

Godlewski, Turk-Ariss and Weill (2014) examine the market reaction to conventional bond issues vs *Sukuk* issues. They found that there is no significant market reaction to conventional bond issues, but a significant negative stock market reaction to *Sukuk* issues. Some studies have established that changes in macroeconomic variables contain important information for stock market participants.

Balcilar, Cerci, & Demirer (2016) examined the international diversification benefits of *Sukuk* for equity investors in conventional stock markets. The authors compared the diversification benefits of these securities with their conventional alternatives from advanced and emerging markets. They found that asymmetric shocks are observed from conventional stocks and bonds into *Sukuk*. Compared to emerging market bonds, *Sukuk* are found to display a different pattern in the transmission of global market shocks.

Klein & Weill (2016) investigated the determinants for firms to choose *Sukuk* over conventional bond. They examined the potential impact of information asymmetries through moral hazard and adverse selection to explain why firms prefer using *Sukuk*. They performed logit regressions of the choice of debt type to determine which characteristics lead a firm to issue a Sukuk rather than a bond and they found evidence of the influence of information asymmetries and adverse selection on the choice of the *Sukuk* market.

The present study adds to the scarce literature on the empirical determinants of international *Sukuk* issuance and Iranian financial market capacity for issuing such securities.

## 4. Methodology and the Model

In this section, we will present the methodology. Empirical finding on determinants of the international Sukuk market development are also presented for 21 countries namely: Bahrain, China, France, Germany, Hong Kong, Indonesia, Japan, Kazakhstan, Kuwait, Luxembourg, Malaysia, Pakistan, Qatar, Saudi Arabia, Singapore, South Africa, Sudan, Turkey, United Arab Emirates, United Kingdom & United States. The sample is for 2000-2015 and contains important indices in financial structure and financial development based on World Development Indicators (World Bank, 2016). Accordingly, we use the data of 34 related economic and financial indicators for 21 countries. Also, we use a dataset of international *Sukuk* issuances from

2001 to 2015 using International Islamic Financial Market (IIFM), Thomson Reuters Zawya and Bloomberg databases.

We do not have any international *Sukuk* market in Iran. In this paper we predict international *Sukuk* capacity using Calibration method. First of all, we use ANOVA analysis and PCA to select indicators which discriminate countries with more than average international *Sukuk* issuance in the world. Second, we use discriminate analysis to select important indicators that affect *Sukuk* issuance. Third, we estimate capacity of issuing international *Sukuk* in Iran, using calibrated coefficient of important indicators.

## 4.1. ANOVA analysis and variable selection

Initially, the univariate analysis of variance (ANOVA) test was applied to the 34 indicators which have discriminating ability for the country that issue international *Sukuk* more than average and others in the year before. Table 5 presents means and standard deviations of the indicators for the two groups (non-failed and failed), and significance tests for the equality of group means for each indicator. *F* statistics and their observed significance levels are shown in the last two columns.

Indicators are presented in ascending order, according to the significance level of *F* statistics in Table 5. The significance level is small (<5%) for the first 18 indicators. Hence, the null hypothesis that the two group means are equal is rejected at 5% significance level for these indicators. The other indicators displayed in Table 5 were excluded from the analysis, since they were not able to split the countries into the non-failed and failed groups. Equality of group means for these indicators cannot be rejected at 5% significant level.

The other test statistics calculated in Table 5 is Wilks' lambda ( $\lambda$ ) which is the ratio of within-groups sum of squares to the total sum of squares. $\lambda$ takes the value between 0 and 1 ( $0 \le \lambda \le 1$). $\lambda = 1$ means all observed group means are equal. Values close to 0 occur when within - group variability is small compared to the total variability. That is, most of the total variability is attributable to differences between the means of the groups. As can be seen in Table 5, the group means of the first 12 indicators are most different for non-failed and failed countries.

**Table 5. Test of Equality of Group Means for the Selected Indicators**

| Indicators | Symbol | More than average | | Others | | F | Wilks' Lambda | Sign |
|---|---|---|---|---|---|---|---|---|
| | | Std. deviation | Mean | Std. deviation | Mean | | | |
| Bank deposits to GDP (%) | R1 | 73.84 | 103.9055 | 100.69768 | 130.94 | .495 | . 84 | .04 |
| Stock market capitalization to GDP (%) | R2 | 73.85 | 104.3714 | 100.69768 | 130.94 | .478 | . 74 | .04 |
| International debt issues to GDP (%) | R3 | 116.86 | 136.0558 | 31.99099 | 46.34 | 2.324 | . 72 | .01 |
| Outstanding international public debt securities to GDP (%) | R4 | 137.20 | 102.9276 | 24.03327 | 29.11 | 1.143 | . 86 | .02 |
| Bank lending-deposit spread | R5 | 4.50 | 8.9 | 19.14 | 3.9 | 1.242 | . 85 | .02 |
| Consumer price index (2010=100, average) | R6 | 22.42 | 30.0531 | 28.52495 | 28.50 | .018 | .60 | .008 |
| Population (Total) | R7 | 41.63 | 41.6196 | 41.10803 | 58.06 | .595 | . 93 | .04 |
| Central government debt, total (% of GDP) | R8 | 11.54 | 14.6895 | .60776 | 6.14 | 2.165 | . 74 | .01 |
| Current account balance (% of GDP) | R9 | 44.96 | 112.7543 | 100.77527 | 104.71 | .106 | .89 | .007 |
| GDP growth (annual %) | R10 | 45.19 | 115.7393 | 107.09473 | 112.24 | .019 | .87 | .008 |
| General government final consumption expenditure (% of GDP) | R11 | 22.42 | 30.0531 | 28.52495 | 28.50 | .018 | .90 | .008 |
| Real effective exchange rate index (2010 = 100) | R12 | 41.63 | 41.6196 | 41.10803 | 58.06 | .595 | . 93 | .04 |
| Money and quasi money growth (annual %) | R13 | 11.71 | 13.5076 | .63500 | 5.91 | 1.662 | .980 | .22 |
| Stock market total value traded to GDP (%) | R14 | 1.33 | 1.2110 | .15283 | .23 | 2.113 | .975 | .15 |
| Domestic credit to private sector (% of GDP) | R15 | 11.54 | 14.6895 | .60776 | 6.14 | 2.165 | .974 | .14 |
| Outstanding domestic private debt securities to GDP (%) | R16 | 1.468 | 3.9396 | 1.88673 | 3.23 | .863 | .990 | .35 |
| Outstanding domestic public debt securities to GDP (%) | R17 | 17.06 | 20.0835 | 8.69947 | 36.44 | 3.599 | .958 | . 61 |

| Indicators | Symbol | More than average | | Others | | F | Wilks' Lambda | Sign |
|---|---|---|---|---|---|---|---|---|
| | | Std. deviation | Mean | Std. deviation | Mean | | | |
| Outstanding international private debt securities to GDP (%) | R18 | 55.051 | 39.8685 | 10.61054 | 10.62 | 1.114 | .987 | .29 |
| Stock market turnover ratio (%) | R19 | 12.36 | 88.3799 | 32.24371 | 74.41 | 4.011 | .953 | .04 |
| Outstanding total international debt securities / GDP (%) | R20 | 44.40 | 140714750 | 24 | 23037500 | .867 | .990 | .35 |
| Credit to government and state owned enterprises to GDP (%) | R21 | 27.44 | 259530 | 48 | 1687500 | .163 | .998 | .68 |
| Oil rents (% of GDP) | R22 | 40.86 | 25.3036 | .000 | .0000 | 1.516 | .982 | .22 |
| Portfolio investment, bonds | R23 | 7.18 | 5.9708 | 1.294 | 3.49 | .470 | .994 | .49 |
| Private bond market capitalization to GDP (%) | R24 | 3.48 | 3.7225 | 8.13 | 7.02 | 2.946 | .965 | .09 |
| Risk premium on lending | R25 | 541.99 | 154.0719 | .000 | .0000 | .320 | .996 | .57 |
| Depositors with commercial banks (per 1,000 adults) | R26 | 80.96 | 140.4428 | 139.97 | 178.72 | .794 | .990 | .37 |
| Liquid liabilities to GDP (%) | R27 | 73.46 | 74.2048 | 16.95 | 25.33 | 1.746 | .979 | .19 |
| Deposit money bank assets to GDP (%) | R28 | 4.531 | 14.2842 | 6.14 | 12.02 | .922 | .989 | .34 |
| Bank credit to bank deposits (%) | R29 | 3.16 | 3.0924 | 5.76 | 3.4414 | .043 | .999 | .83 |
| NO. of listed companies per 10k population | R30 | 83.200 | 34434601 | 21 | 957507750 | 3.540 | .959 | . 63 |
| Public bond market capitalization to GDP (%) | R31 | 86.77 | 1176.7025 | 79.66 | 4727.97 | 4.693 | .946 | . 33 |
| Firms with a bank loan or line of credit (%) | R32 | 2.66 | 1.8764 | 3.41 | 2.90 | .559 | .993 | .45 |
| Investments financed by banks (%) | R33 | 6.58 | 1691519 | 10 | -856665 | 3.154 | .963 | . 79 |
| Bank capital to assets ratio (%) | R34 | 140.05 | 140.5071 | 29.06757 | 45.44 | 1.819 | .978 | .18 |

*Source:* Authors'.

These factors can influence international *Sukuk* issuance. For instance, the higher level of GDP growth, the higher level of need to external funding and the greater is the development of the international *Sukuk* market. Also, there is a strong negative relationship between inflation and *Sukuk* market development. A stable economic environment is favorable to the development of both bonds and *Sukuk* market.

In the following sections, Principal Component Analysis (PCA) was applied to the 13 indicators and the important factors in explaining international *Sukuk* issuance were determined. Factor scores were calculated for each of the countries, and these scores were used as independent variables in estimating parsimonious discriminant model.

## 4.2. Principal Component analysis

The main objective of the principal component analysis (PCA) here is to determine the important determinants (characters) which can explain international *Sukuk* issuance of the countries. PCA explores underlying patterns of relationship between the indicators; they must be correlated to each other for the PCA to be appropriate. Therefore before proceeding to the PCA, appropriateness of indicators to the PCA was evaluated. The evaluation was performed by Bartlett's test of sphericity. Bartlett's test can be used to test the null hypothesis.

Table 6 presents the results of Bartlett's test of sphericity. The value of the Chi-square test statistic for sphericity is large and observed significance level is small enough (<1% significance level), so the null hypothesis, can be rejected.

**Table 6. Results of KMO and Bartlett's Test of Sphericity**

| Description | Value |
|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | .753 |
| Bartlett's Test of Sphericity | 3115.748 |
| df | 66 |
| Sig. | .000 |

*Source:* Authors'.

In PCA, four-common factors are needed to represent the indicators. Percentages of total variances explained by each factor were estimated

(eigenvalues). Table 7, presents the estimated factors and their eigenvalues. In PCA, indicators are expressed in standardized form, with a mean of 0 and the standard deviation of 1. 12 indicators were used in the study; then each indicator's standardized variance is 1 and total variance is 12. Only those factors that account for variances greater than 1 (eigenvalue>1) were included in the model. Factors with variance less than 1 are not better than a single indicator, since each indicator has a variance of 1. Hence, the first 4 factors [bank deposits to GDP (%), stock market capitalization to GDP (%), international debt issues to GDP (%) & outstanding international public debt securities to GDP (%)] were included in the model. The estimated four-common factor model explains 70.39% of the total international *Sukuk* for countries.

**Table 7. Eigenvalues of the Factors**

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 3.250 | 27.085 | 27.085 | 3.250 | 27.085 | 27.085 |
| 2 | 2.261 | 18.839 | 45.924 | 2.261 | 18.839 | 45.924 |
| 3 | 1.547 | 12.890 | 58.814 | 1.547 | 12.890 | 58.814 |
| 4 | 1.390 | 11.585 | 70.399 | 1.390 | 11.585 | 70.399 |
| 5 | .967 | 8.056 | 78.455 | | | |
| 6 | .787 | 6.558 | 85.013 | | | |
| 7 | .725 | 6.045 | 91.058 | | | |
| 8 | .397 | 3.305 | 94.363 | | | |
| 9 | .329 | 2.741 | 97.104 | | | |
| 10 | .186 | 1.551 | 98.656 | | | |
| 11 | .108 | .900 | 99.556 | | | |
| 12 | .053 | .444 | 100.000 | | | |

*Source:* Authors'.

Ratio of bank deposits to GDP is the most important determinant in explaining international *Sukuk* issuance. It explains 27.08% of the total variance of the indicators. It is one of the financial structure indicators and affects the development of financial markets including international *Sukuk* market. Low bank deposit is a sign that shows that country does not have a strong investor base for investment in financial markets.

The second most important ratio is stock market capitalization to GDP that explains about 18.84% of the total variance. To approximate the size of stock markets, the most common choice in the literature is stock market capitalization to GDP. Stock market size is used as a measure of the overall degree of capital market depth and is one of the important factors that indicates the development of a country's financial market.

International debt issues to GDP and outstanding international public debt securities to GDP are the next two main factors that determine international *Sukuk* issuance. They explain 12.89% and 11.85% of the total variance, respectively. These are two important factors to measure the depth of a financial market.

The other objective of the PCA is to calculate factor scores for each of the countries according to the four factors determined. In PCA, all indicators are standardized, with a mean of 0 ( $\mu = 0$ ) and the standard deviation of 1 ( $\sigma = 1$ ) according to Eq. (1), r represents indicators and C represents countries;

$$Z_{cr} = \frac{R_{cr} - \mu_r}{\sigma_r} \qquad \text{r= 1,2,…,12} \qquad \text{c= 1,2,….,21} \qquad (1)$$

Estimated factors can be expressed as a function of the observed original variables (indicators). In order to estimate the $j^{th}$ factor score ($F_{cj}$) for Country C, Eq (2) was used below:

$$F_{cj} = \sum_{r=1}^{12} W_{rj} Z_{cr} \qquad \text{j=1, 2,..,4} \qquad (2)$$

where, $W_{rj}$ is the factor score coefficient, for the $j^{th}$ factor and $r^{th}$ indicator and $Z_{cr}$ is the standardized value of the $r^{th}$ indicator for country C. Table 8, presents the factor score coefficient matrix ($W_{rj}$) estimated by PCA.

## Table 8: Factor Score Coefficients Matrix ($W_{rj}$)

| Indicator | Component | | | |
|---|---|---|---|---|
| | $F_1$ | $F_2$ | $F_3$ | $F_4$ |
| R1 | .716 | -.101 | .171 | .263 |
| R2 | .582 | -.541 | .241 | .356 |
| R3 | .547 | .675 | -.341 | -.155 |
| R4 | .539 | .621 | -.359 | .071 |
| R5 | .528 | .106 | .572 | -.262 |
| R6 | -.281 | .125 | .307 | -.652 |
| R7 | -.498 | .080 | -.424 | .261 |
| R8 | .758 | .332 | .049 | -.205 |
| R9 | -.105 | .774 | .405 | .403 |
| R10 | -.478 | .453 | .392 | .549 |
| R11 | -.266 | .088 | .540 | -.144 |
| R12 | .565 | -.403 | .047 | .278 |

Source: Authors'.
Note: Extraction Method: Principal Component Analysis

## Table 9. Factor Loadings

| Indicator | Component | | | |
|---|---|---|---|---|
| | $F_1$ | $F_2$ | $F_3$ | $F_4$ |
| R1 | .037 | .286 | .092 | .082 |
| R2 | -.144 | .391 | .066 | .038 |
| R3 | .405 | -.110 | -.020 | -.040 |
| R4 | .383 | .005 | -.109 | .035 |
| R5 | -.025 | -.021 | .443 | .061 |
| R6 | -.071 | -.373 | .334 | -.118 |
| R7 | .045 | -.003 | -.363 | .033 |
| R8 | .231 | -.013 | .209 | -.042 |
| R9 | .081 | .041 | .056 | .509 |
| R10 | -.085 | .099 | -.060 | .511 |
| R11 | -.168 | -.114 | .273 | .158 |
| R12 | -.047 | .317 | .000 | -.019 |

*Source:* Authors'.
*Notes:* Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization. Component Scores.

To enhance the interpretability of the factors, the varimax factor rotation method was used in PCA. This method minimizes the number of variables that have high loadings on a factor. Table 9, presents the factor loadings. Here, variables with large loadings for the same factors are grouped and small factor loadings (<0.5) are omitted. Estimated factor represents a specific indicator of the countries under consideration.

After determination of the basic factors for the countries, discriminant model was estimated according to these factors. The basic assumption of the estimation of early warning models are based on that countries can be split into two groups; non-failed group and the failed group. Thus, countries can be represented by a dummy dependent variable $y_i$ such that, $y_i = 0$ if the $i^{th}$ country is non-failed, $y_i = 1$ if the $i^{th}$ country failed.

## 4.3. The Discripant model

In the discriminant analysis it is considered that any country C is characterized by a vector of elements that are measurements of four independent variables. For two populations (more than average and others) it is assumed that the independent variables are distributed within each group according to multivariate normal distribution with different means but equal dispersion matrices.

The objective of this method is to obtain the linear combination of the independent variables that maximizes the variances between the populations relative to within-group variance. The linear combination of the factor scores provide for each country a D-score, according to the estimated canonical discriminant model below.

$$D_c = 0.20R_1 + 0.50R_2 + 0.15R_3 + 0.57R_4 + 0.51R_5 + 0.36R_6 + 0.21R_7 + 0.73R_8 + 1.30R_9 + 1.21R_{10} + 1.1R_{11} + 0.41R_{12} \quad (3)$$

In Eq. (3), $D_c$ is the D-score for country C and $R_i$ represents the indicators.

**Table 10. The Statistics of the Estimated Discriminant Model**

| Eigenvalue | Canonical correlation | Wilks'Lambda |
|---|---|---|
| 0.90 | 0.574 | 0.671 |

*Source:* Authors'.

In order to evaluate the effectiveness of the estimated discriminant model, the model statistics were calculated in Table 10. An effective discriminant model is one that has much between-group variability of D-scores when compared to within-group variability of D-scores. Coefficients of the discriminant model are chosen so that the ratio of the between-groups to within-groups sum of squares of D-scores is as large as possible. Any other linear combination of the predictor variables will have a smaller ratio. The eigenvalue statistic presented in Table 10, is the ratio of the between groups to within-group sum of squares of D-scores. Large eigenvalue (0.90) shows that the estimated discriminant model has high discriminating ability. Canonical correlation (0.574) is the measure of degree of association between D-scores and the group variable that is coded 0 for more than an average international *Sukuk* issuance and 1 for others. As stated previously, small value of Wilks' lambda (0.671) means that most of the total variability is attributable to differences between the means of the D-score of the groups.

Based on its D-score and the calculated cut-off score (C) in Eq. (4), a country is classified to more than average or others group. The optimum cut-off score is calculated approximately equal to 0.83, as the unweighted average of the D-scores of the more than average or others group:

$$C = \frac{Dscore_{non-failed} + Dscore_{failed}}{2} = 0.83 \quad (4)$$

where C is cut-off score.

The classification is made by the following procedure: if D-score > C, the country is classified to more than average group, if D-score <C, the country is classified to the others.

The coefficient of indicators is explained in equation 5. $ISI_c$ is international *Sukuk* issuance and $R_i$ represents the indicators.

$$ISI_c = 40.99 + 0.42R_1 + 0.56R_2 + 0.26R_3 + 0.35R_4 + 0.68R_5 + 0.69R_6 + 0.78R_7 + 0.99R_8 + 0.80R_9 + 2.22R_{10} + 0.50R_{11} + 1.4R_{12} \quad (5)$$

## 4.4. Capacity of international sukuk issuance in Iran

The Securities Market Act of the Islamic Republic of Iran was ratified by the Iranian Parliament in 2005 and subsequently replaced the former one called

the Establishment Act of the Stock Exchange approved in 1966. This led to development of Iranian capital market and introducing new financial instruments including *Sukuk*. Unfortunately, because of many reasons including economic sanctions, the international sector of *Sukuk* market has not been active enough in recent years. However, after the Joint Comprehensive Plan of Action (JCPOA) in 2015 known commonly as the *Iran Deal*, conditions have been more favorable and there is an opportunity for potential investors in Iranian capital market to take advantage of international financial instruments. So estimation of this capacity can help domestic and foreign policymakers and investors to get a better view from its potential issuing base for international *Sukuk.*

In this section we use Coefficients of equation (5) and indicators in Iran to estimate the international *Sukuk* issuance capacity in Iran. Table 11 shows the results.

**Table 11. Capacity of International *Sukuk* Issuance in Iran (USD Million)**

| Year | Capacity |
|---|---|
| 2000 | 10,037,300 |
| 2001 | 11,458,370 |
| 2002 | 11,332,746 |
| 2003 | 13,147,851 |
| 2004 | 15,878,252 |
| 2005 | 18,667,245 |
| 2006 | 21715835 |
| 2007 | 28,022,599 |
| 2008 | 33,235,377 |
| 2009 | 32,536,468 |
| 2010 | 58,080,779 |
| 2011 | 58,831,124 |
| 2012 | 49,818,426 |
| 2013 | 36,563,955 |
| 2014 | 610,713,735 |

*Source:* Authors'.

## 5. Conclusions

There is no doubt that Islamic finance has worldwide appeal. This is evident not only because of the growth of the industry in terms of volume and asset size as well as the number of Islamic financial institutions, but also because a large number of Islamic finance transactions to date are cross-border in nature. *Sukuk* are perhaps the most successful and most visible Islamic finance product today. Given the range and international diversity of *Sukuk* issuers, it is obvious that *Sukuk* have become internationally accepted as Islamic finance products.

To fully exploit the potential of *Sukuk* as vehicles for development, a holistic approach is needed to facilitate access to international *Sukuk* markets and the development of domestic *Sukuk* markets. Agendas for conventional debt instruments tend to concentrate on domestic markets. In the case of *Sukuk*, both international and domestic capital markets should be analyzed. While countries with pools of Islamic savings are natural candidates to develop domestic markets given the domestic Islamic financial ecosystem, many countries have found that the international markets are more accessible given the critical mass of Islamic investors. This is also true even for some countries with a significant Muslim population.

Iran is one of the largest players in terms of Islamic finance assets. But most of these assets are related to Islamic banking sector. So there is a good potential for developing other sectors like *Sukuk* especially in a cross-border environment.

This paper investigated the determinants of the development of the international *Sukuk* market in different countries and estimated the capacity of issuing such securities in Iranian financial market. For this purpose, we used data from 21 countries in the world during 2000-2015. Well known multivariate statistical technique (principal component analysis) was used to explore the basic characteristics of the country, and discriminant model was estimated based on these characteristics to construct the model.

Results of the study show that PCA is a useful tool for explicitly exploring the determinants of international *Sukuk* issuances and comparing the countries with respect to these characteristics, thus, determining differences in the structures of the countries.

In the discriminant analysis, for two populations (more than average and others) it is assumed that the independent variables are distributed within each group according to multivariate normal distribution with different means but equal dispersion matrices. Based on D-score and the calculated cut-off score, if D-score > C, the country is classified to first group and, otherwise, the country is classified to the other group.

We find that four factors including bank deposits to GDP (%), stock market capitalization to GDP (%), international debt issues to GDP (%) and outstanding international public debt securities to GDP (%) have had the greatest impact on international *Sukuk* issuances by different countries.

Finally, we used indicators of Iran and coefficient in PCA model to measure the capacity of international *Sukuk* in Iranian financial market. This measure shows if Iran had an international *Sukuk* market, how much international *Sukuk* it could issue. We do not predict these indicators, thus we do not predict future capacity.

According to this paper, there is an untapped potential for issuing international *Sukuk* in Iranian capital market. The international *Sukuk* market holds high potential to tap for funding for strategic areas such as infrastructure development, capital adequacy enhancement, etc. Therefore, different issuers including government of Iran, large corporations, public entities and financial institutions can use this opportunity to meet their financing needs. For that, policy makers and regulators should provide a sound business environment through development of legal, operational and economic infrastructures in the case of international *Sukuk*.

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