



**UNIVERSITI PUTRA MALAYSIA**

**CLASSIFICATION, YIELD TO MATURITY DETERMINANTS  
AND VALUATION OF ISLAMIC DEBT SECURITIES**

**MEYSAM SAFARI**

**GSM 2012 1**

**CLASSIFICATION, YIELD TO MATURITY DETERMINANTS AND  
VALUATION OF ISLAMIC DEBT SECURITIES**

**By**

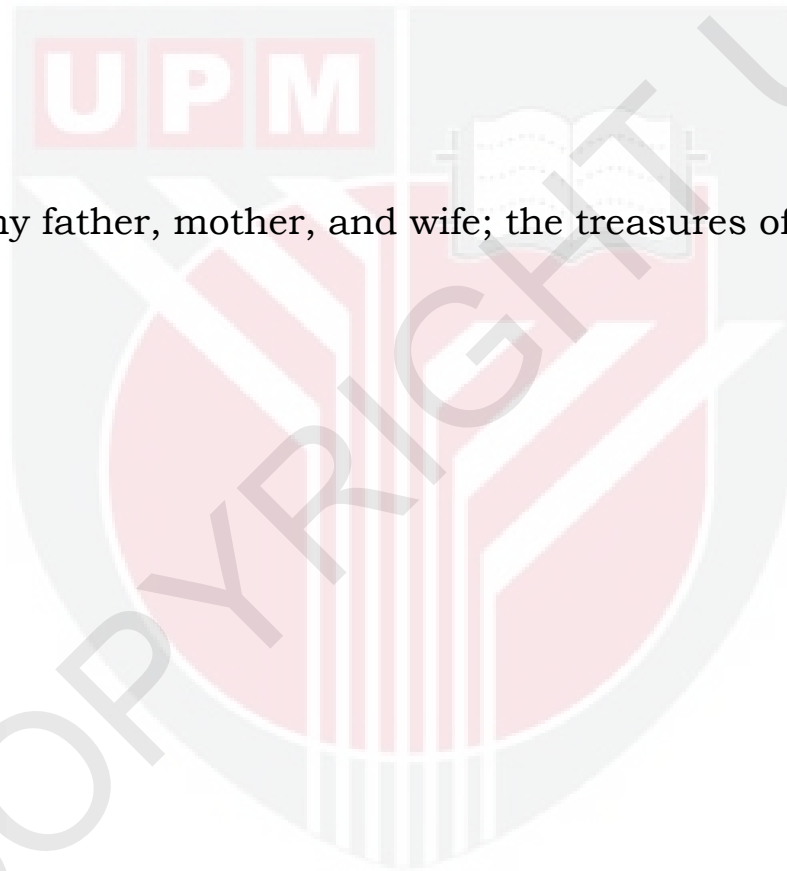
**MEYSAM SAFARI**

**Thesis submitted to the Graduate School of Management,  
University Putra Malaysia, in Fulfillment of the  
Requirement for the Degree of Doctor of Philosophy**

**July 2012**

## **DEDICATION**

To my father, mother, and wife; the treasures of my life



## **ABSTRACT**

Abstract of thesis presented to the Senate of University Putra Malaysia in fulfillment of requirement for the degree of Doctor of Philosophy

### **CLASSIFICATION, YIELD TO MATURITY DETERMINANTS AND VALUATION OF ISLAMIC DEBT SECURITIES**

By

**MEYSAM SAFARI**

**July 2012**

**Joint Chairs :**

**Professor Dr. Shamsheer Mohamad Ramadili Mohd, PhD**

**Professor Dr. Mohamed Ariff, PhD**

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*Sukuk* securities are new debt instruments introduced to market since less than two decades ago. The market has grown to about US\$ 850 billion in just 16 years. Unlike conventional bonds, which have been studied thoroughly over some 6 decades, there is a dearth of studies on *sukuk* market behavior. This thesis aims to begin one by providing: (i) a new and comprehensive classification; (ii) exploratory findings on determinants of yield; (iii) a comparison of yields of *sukuk* and bond securities; (iv) charting new time-line cash flow charts; (v) establish first principles of valuation for *sukuk*; (vi) a comparison of actual price against theoretical prices computed using conventional theory. In particular objectives (iv) and (v) are critical for market practices as well as academic teaching.

We collected primary and secondary data covering 2001-2011 for 11 countries: the data set had 37,000 observations. Apart from using

descriptive and simple statistical methods to analyze *sukuk*, regression analyses are used to estimate empirical determinants of yield to maturity, tested by parametric and non-parametric methods. Granger Causality tests are applied to explore a central question as to whether there is a causality link between yields of *sukuk* securities and yields of conventional bonds. In valuation model development, mathematical techniques are applied to identify the principles that should be considered in constructing valuation models.

After careful examination of mostly descriptive statistics, we propose a new classification to categorize underlying contracts based on the intrinsic nature of fund raising: Pure-Debt, Equity-based, and Asset-Backed. Furthermore, Yields are analyzed to determine what factors influence them using cross-sectional tests. Liquidity, country of domicile, issuer-country risk, promised payments' rate, maturity, and issue size are found to be significant factors affecting *sukuk* yields. Payment frequency and market sectors are not relevant. Importantly, the magnitudes of the factor effects are different in different *sukuk* types.

An important finding is that *Sukuk* securities are different from conventional bonds. Data on *sukuk* and matched bonds of (i) government, (ii) central bank, (iii) agencies, (iv) financial institutions, and (v) corporate issues are tested via pair-wise tests. Tests on yield spreads suggest there is a *significant difference* between *sukuk* and

bonds in 72 per cent of tested pairs. There is also no causal relation in Granger Causality tests between yields of two types of securities.

Current market practices of pricing *sukuk* securities by means of typical conventional models are tested. Results show that there is a significant deviation between model-driven and market prices, questioning the use of bond formula. Using mathematical techniques, modified valuation models are proposed. Underlying *Shariah*-consistent contractual specifications are taken into account. Price limit for *musharakah sukuk* securities is proposed.

Most important finding is the nullifying of the assumption of sameness of *sukuk* and conventional bonds. This implies that conventional bond and *sukuk* certificates are intrinsically different, so market needs to develop new methods of valuation and measurements. Moreover, by providing classification as well as creating a foundation literature, a better understanding is possible for more advanced studies of this growing market. Our identification of determinants of yields to maturity and the development of valuation models will enable changes in practices to be adopted. More research may be done on building complex valuation models based on our time line flow charts of cash flow.

## **ABSTRAK**

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

### **KLASIFIKASI, PENENTU PULANGAN HINGGA MATANG DAN PENILAIAN SEKURITI PINJAMAN BERLANDASKAN SHARIAH**

Oleh

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*Sukuk* merupakan instrumen hutang baru yang diperkenalkan ke dalam pasaran kurang dari dua dekad yang lalu. Pasaran *Sukuk* telah berkembang kepada kira-kira US850 bilion sejak ia diperkenalkan 16 tahun yang lepas. Tidak seperti bon konvensional yang telah banyak dikaji dengan mendalam sejak enam dekad yang lalu, tidak banyak kajian dilakukan ke atas gelagat pasaran *Sukuk*. Tesis ini bertujuan untuk menghasilkan satu permulaan yang berhati-hati dengan meneliti : (i) klasifikasi baru dan komprehensif untuk diguna; (ii) penemuan awal penentu pulangan; (iii) membuat perbandingan pulangan ke atas *Sukuk* dengan bon konvensional setelah mengawal beberapa faktor; (iv) mencatatkan garisan masa baru carta aliran tunai; (v) menentukan prinsip-prinsip utama untuk penilaian *Sukuk*; membandingkan harga sebenar dan harga teoretikal yang dikira dengan menggunakan teori konvensional, (vi)

membuat perbandingan antara harga sebenar dengan harga teori dengan menggunakan teori konvensional. Terutamanya objektif (iv) dan (v) adalah kritikal untuk amalan industri dan juga tugas pengajaran akademik.

Data primer dan sekunder 11 negara bagi tahun 2001-2011 telah dikumpul; set data ini merangkumi 37,000 pemerhatian. Tujuh puluh lima peratus dari nilai pasaran *sukuk* yang diterbitkan di seluruh dunia adalah di Malaysia. Selain mengguna kaedah deskriptif dan statistik mudah, kaedah analisis regresi juga digunakan untuk menganggarkan penentu pulangan yang diuji dengan kaedah parametrik dan bukan parametrik. Ujian “*Granger Causality*” digunakan untuk menentukan persoalan pokok sama ada terdapatnya perkaitan sebab-dan-akibat antara pulangan *Sukuk* dan pulangan bon konvensional. Di mana perlu, dalam membentuk model-model penilaian, teknik matematik termaju digunapakai untuk mengenalpasti prinsip-prinsip yang perlu diambil kira dalam proses pembentukan model-model tersebut.

Setelah penilaian terperinci yang kebanyakannya berbentuk statistik deskriptif, adalah dicadangkan satu klasifikasi komprehensif digunapakai untuk semua kontrak yang sedia ada ke dalam tiga kumpulan, iaitu: kontrak berdasarkan hutang sepenuhnya, kontrak berdasarkan equiti sepenuhnya dan kontrak berdasarkan Aset. Klasifikasi berdasarkan tiga kumpulan tersebut dicadangkan untuk



digunakan di masa depan. Pulangan *sukuk* dianalisa untuk menentukan faktor *Sukuk* relevan yang mempengaruhi dengan menggunakan ujian rentas silang. Kecairan, negara penerbit, risiko negara penerbit, kadar bayaran yang dijanjikan, tempoh matang dan saiz penerbitan merupakan faktor yang memberi kesan signifikan terhadap pulangan *sukuk*. Kekurangan dan sektor pasaran adalah tidak relevan. Magnitud kesan faktor-faktor adalah berbeza untuk jenis *sukuk* yang berlainan. Satu penemuan penting ialah sekuriti *Sukuk* adalah berbeza berbanding dengan bon konvensional. Data *sukuk* dan bon biasa yang diterbitkan oleh (i) kerajaan, (ii) bank negara, (iii) agensi, (iv) institusi kewangan, dan (v) koperat diuji menggunakan ujian pasangan. Ujian ke atas “taburan pulangan” menunjukkan perbezaan yang signifikan antara *sukuk* dan bon biasa bagi 72 peratus dari sampel yang diuji. Walaubagaimana pun Ujian Kasualiti Granger tidak menunjukkan perkaitan (hubungkait) antara pulangan *sukuk* dan bon biasa.

Amalan penentuan harga pasaran semasa ke atas penilaian *sukuk* dengan menggunakan model konvensional yang tipikal juga diuji. Penemuan menunjukkan terdapatnya penyisihan yang signifikan antara model berpandu pasaran dan harga pasaran, dan ini menimbulkan persoalan penggunaan formula bon. Dengan menggunakan teknik matematik, model penilaian yang diubahsuai dicadangkan. Spesifikasi kontrak berlandaskan Syariah perlu diambil kira. Had harga bagi *sukuk* musharakah juga dicadangkan.

Penemuan yang paling penting ialah penentuan bahawa andaian kesamaan antara *sukuk* dan bon biasa ditolak. Implikasi dari penemuan ini ialah bahawa sijil bon konvensional dan *sukuk* adalah berbeza dengan ketara, jadi pasaran perlu membentuk kaedah penilaian dan pengukuran baharu. Tambahan pula, dengan menyediakan pengklasifikasi dan juga merekapi literatur asas, pemahaman yang lebih mantap untuk membolehkan pengajian lanjutan pasaran kewangan Islam yang pesat membangun. Dengan mengenalpasti penentu pulangan hingga kematangan dan pembangunan model penilaian akan mengubah amalan yang digunapakai. Lebih banyak penyelidikan mungkin perlu dilakukan untuk membentuk model penilaian yang canggih berdasarkan garis-masa carta aliran tunai.

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Every voyage has an end, and reaching the destination is the ultimate moment of success and happiness of the whole journey. This moment of joy is remembered and cherished for long times. This is true, especially when you sail in misty water, full of unforeseen weaknesses and dangers hampering you from reaching where you initially headed to. These challenging times, which have sank many before, are sometimes forgotten in the moments of victory. Then, only one should praise all the kindnesses and helps he received. The burdens of the way are heavier than one could bear alone. In my own story, I was blessed with best of the best accompanies one may dream of.

I still can remember the first time I discussed my idea of research topic with **Professor Dr Ariff Mohamed**. I vividly remember his reasons on how and where I was wrong in my approach; and I can remember our long discussion on what can be a good research topic and his suggestions. I'm very happy and proud with my decision on working on his genuine noble idea which turned into this dissertation in less than two and half years. Two years which are of my best years ever experienced, not only because I learned what I know about *sukuk* and Islamic finance, but I learned much more than that. I learned the scholar way of thinking from numerous and various discussions I had with professor Ariff, discussions which were never

limited to the topic of the research. I learned from his outstanding and humble behavior the way a man should behave. His knowledge, expertise, support, guidance, contributions, motivations, and professionalism contributed to my work beyond the measure of words. I owe him much of this success and will remember forever. It has been a privilege for me being your student. Thank you very much Professor Ariff.

I still remember my numerous discussions with **Professor Dr Shamsheer Mohamad Ramadili Mohd** on different areas of research in finance and his suggestions on working in the field of Islamic Finance. I am very glad that I followed his suggestions and entered this blessed area. His deep understanding of different finance theories and exceptional talent in asking the right scholarly questions was a guide and example for me the whole duration of my research. He has been and is a true devoted Muslim, in beliefs, manners, and behavior and a personality which can be exemplified for many. His unique passion for contributing to the young body of Islamic Finance and his high level expectations of the quality of academic work have been drive force for me in all my efforts. I learned from him things beyond the expectations, and much more than finance. His knowledge, persistence, expertise, support, guidance, contributions, and motivations contributed to my work very much. I owe him much of this success and will remember forever. It has been a privilege for me being your student. Thank you very much Professor Shamsheer.

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I still remember when I was applying for **Yayasan Khazanah** scholarship. Rounds of interviews and tests challenged my determination and desire for pursuing the doctoral studies. Conducting this research and my whole PhD was impossible if I did not receive a generous scholarship from Yayasan Khazanah. I was blessed with this great support from the most prestigious foundation in Malaysia. I am greatly proud and privileged to be a member of this family. I have received not only financial support and professional trainings, but also been treated as a trusted scholar of the greatest entity of the country. I am thankful to the Managing Director of Khazanah Nasional Berhad, *Tan Sri Dato' Azman Mokhtar* and

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I believe a man's success is rooted and nourished in his **family**, a foundation and cornerstone that one may rely on forever. I have been blessed by having my family around me. I always have my father, *Alireza Safari* as my role model. He is the man who set the foundation of my life as it is, and I am grateful for that. His patience, persistence, righteousness, decency, and passion for helping others and community in general showed me the direction to eternal happiness. He showed me the meaning of courage and doing the right thing, in despite of the outcome; dedication and commitment, in despite of others appreciation. I always have my mother, *Monirosadat Aghilian* as a source of motivation, enthusiasm, and passion. Her desire to excel embedded in my soul, drives me in tough times. I have been blessed by marrying to a wonderful, kind, noble family. My father-in-law, *Hasan Akhavan Alaf* has been a symbol of passion and desire for excel and patience in tough time. His wisdom is beyond the measure of words. My mother-in-law, *Fatemeh Moshtofar* has been a continuous source of support and motivation for us. She showed me the meaning of sacrifice for a greater cause by encouraging us to pursuit education in despite of being separated. My siblings *Fatemeh Safari*, *Sadegh Safari*, and *Ehsan Akhavan* are truly and honestly a great source of motivation and happiness. They have encouraged me to go the distance in these years. Their support, motivation, enthusiasm, encouragement, and kindness have been the source of my power to come this far. Thank you very much.



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## **APPROVAL**

I certify that a Thesis Examination Committee has met on **4 July 2012** to conduct the final examination of Meysam Safari on his thesis entitled “**Classification, Yield to Maturity Determinants and Valuation of Islamic Debt Securities**” in accordance with the Universities and University Colleges act 1971 and the Constitution of the Universiti Putra Malaysia [P.U(A)106] 15 March 1998. The Committee recommends that the candidate be awarded the Degree of **Doctor of Philosophy**.

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## **DECLARATION**

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at University Putra Malaysia or any other institutions.



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**Meysam Safari**

Date: 26 July 2012



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