



DESIGN OF IJARAH SUKUK

by

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ABSTRACT

Compared to conventional bonds and total financial assets, the share of Islamic bonds is very small. However, since 2002 the issuance of this instrument has increased rapidly and it is expected to keep increasing in the future. The purpose of the dissertation is to discuss on Ijarah sukuk pricing, and on a review of the literature concerning Shari'ah and financial issues related to the instrument, as a basis to construct a financial model to price it. To build the formula for the Ijarah sukuk, three types of model are used: the model for leasing as illustrated by Schallheim (1994), McConnell and Schallheim (1983) and Myers, Dill and Bautista (1976); the formal mortgage system as illustrated by Ebrahim and Ahmed (2008), and the cost of capital in a non-interest economy by Mirakhor (1996). From the analysis of the above pricing model and also from review of Shari'ah and financial issues related to the instrument, it is concluded that the pricing of Ijarah sukuk is an analogy of conventional bond price with some adjustments such as the presence of SPV (Special Purpose Vehicle) fee, Legal and Shari'ah boards' fee, and operating expenses. This dissertation illustrates four types of formula based on the conditions in the contract, such as the Ijarah sukuk with (1) repurchase transaction held with certainty and with a predetermined price (2) repurchase transaction with certainty and the asset price follows geometric Brownian motion (gBm), (3) repurchase transaction with call option and with predetermined price, (4) repurchase transaction with call option and the asset price follows geometric Brownian motion (gBm).

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INTRODUCTION

In the emerging East Asian economies such as India and Pakistan, and even in newly developed countries such as Singapore, the domestic bond markets are developing only very slowly. Although there has been some progress, this has not kept pace with the overall development of the financial markets (Khalid, 2006). The situation is unlikely to improve in the near future, since as the Asian Development Bank has warned, the US sub-prime crisis will further slow the growth of the Asian bond market in 2008 (Wood, 2008).

There are a number of reasons for this slow development. Pakistan for example lacks the macroeconomic stability and strong social and institutional environment and infrastructure needed for an efficient bond market. Singapore on the other hand has a very small, inactive and less developed share market because it lacks any incentive to issue large amounts of public debt; the consistent budget surplus means that companies in Singapore are able to borrow money from the banks at reasonable rates of interest. However, the condition is no longer limited to emerging and newly developed countries in Asia: the spill over effect from the US sub-prime crisis is causing serious problems for European markets, delaying new bond issue activities for both corporate and sovereign issues (Chung et al., 2007).

Compared to conventional bonds and total financial assets, the share of Islamic bonds is very small. For example, although 85% of the population of Indonesia are Muslim, the country has the least sophisticated market for Islamic finance. According to BAPEPAM, only 2.5% of the total bond issuance is in Islamic bonds. Even in Malaysia, considered the leader of the regulatory development framework for Islamic finance, and where Islamic bonds make up half of the total bond issuance, only 13% of instruments in the total banking market follow Shari'ah principle (Wright, 2007; Pilling et al., 2006).

Summarizing from Wright (2007), Thakur (2007), Danareksa (2006) and Beris (2007), the small share of Islamic bonds compared to conventional

bonds and total financial assets is caused by the fact that the instrument has emerged only recently, being issued for the first time by Malaysia in 2002. The other reasons for the above condition can be categorized as follows:

1. Regulatory system

Shari'ah principle based regulation and government legislation can support the success of Islamic bond issuance. However, there is a lack of standardization in Shari'ah principle, exemplified by the absence of any uniform and universal principal across countries; uncertainty and ambiguity in the principle; and multiple Shari'ah boards and authorities that can confirm the permissibility of an instrument. Thus it can be difficult to know which Shari'ah principle is being used by issuers. The uncertainty results in a low level of sukuk (Islamic bond) market trading. It also increases the cost of issuance and leads to certain instruments not being accepted in some jurisdictions because of differences in the Shari'ah definition. For example, a Shari'ah compliant product in Malaysia is not always accepted in the Gulf States, due to their stricter school of Islam (Pilling et al., 2006).

There are also differences in the tax charges for Islamic bonds and conventional bonds. For example, although the cash flows for Ijarah sukuk and conventional bonds are similar, the lease payment in Ijarah sukuk which substitutes for the coupon payment in conventional bonds is not tax deductible, whereas the coupon payment is. Another example is that some Islamic financial instruments that transfer underlying assets, such as sales purchase/ leaseback, will attract VAT and be taxed twice in many jurisdictions.

2. Financial environment

The second reason for the low share of Islamic bonds is the financial environment conditions which relate to the instrument. According to Thakur (2007), financial environment encompasses secondary market, critical mass issuance and ratings. The secondary market for sukuk is

not liquid because there is no variety of investor pools or developed regulatory framework. For this reason, and because of the limited massive sukuk issuance, sukuk becomes a buy and hold instrument. With regard to ratings, the problem is that many Islamic financial instruments are not rated by major rating agencies. Moreover, the complexity of the instrument's structure results to a time consuming and expensive rating process.

3. Short supply of scholars and knowledge

The final reason for the small share of Islamic bonds compared to conventional bonds and total financial assets is the lack of Islamic scholars and knowledge. According to Wright (2007), for Islamic bonds to be successful there is a need for a combination of knowledge about Islamic law, business and finance, and ability across a variety of languages so that many people can understand and use the instrument. Every Islamic bond transaction needs approval from Shari'ah boards, even though each transaction replicates a previous one. However, in reality there is insufficient information and a lack of qualified scholars or supervisory boards with a sound understanding of Islamic finance in general and Islamic bonds in particular, and the ability to issue fatwa. This situation increases the time and cost involved in Islamic bond issuance (Berris, 2007; Wright, 2007).

The lack of knowledge about Islamic finance and law has a negative impact not only on the success of Shari'ah based financial instruments, but also on countries' economic conditions. Summarized from Kuran (2003, 2004) and Yousef (2004), one reason for the economic crisis in the Middle East is the lack of access to, and the quality of, the Islamic law and Islamic knowledge and its implementation. A millennium ago, Middle East countries were economically advanced in their standards of living, technology, agricultural productivity, literacy and institutional creativity. However, in the 18th century, there was backwardness in the economy and Middle East

countries became dominated by Western countries well-equipped to mobilize and accumulate capital, aided by a sophisticated and durable commercial and financial system and a better court system to handle issues among companies. In the 1980s-1990s, conditions worsened into a major economic crisis. Public revenues were reduced, and governments found it difficult to pay wage bills. As a result, public debt increased while investment and growth fell dramatically. Thus, finally, the Middle East was left behind parts of East Asia.

According to Timur Kuran (2004), the absence of a corporation concept in Islamic law plays a role in this situation. The other reason for this situation is the lack of *ijtihad* to follow the modern life. Thus, the Islamic partnership law in Middle East is stagnant, which keeps business small, simple and temporary. Thus Middle Eastern economies compare badly with those of the West, where partnership law is complex and has evolved to become much more advanced. This situation might be a result of the lack of understanding and exploration of knowledge and implementation of Islamic law and finance. Therefore, if the practitioner can understand Islamic law and its implementation properly, giving attention also to the development and exploration of the structure of financial instruments based on Shari'ah, such as the Islamic bond, there will be a beneficial impact on the economies of countries that do business according to Shari'ah principle.

Although the share of the market claimed by Islamic bonds is still small, since 2002 the issuance of this instrument has increased rapidly. This is true not only for countries that have a majority of Muslim citizens, such as Indonesia, Malaysia, and Middle East countries, but also for large institutions in the US, UK and Japan, among others (Thakur, 2007; Country Monitor, 2006; Berris, 2007; MEED, 2005, 2006, 2007; Emergingmarketsmonitors.com,2007; Wright, 2007 and Pilling et al., 2006). MEED (2006) also states that many European investors invested in an Islamic bond, or sukuk, issued by Dubai in 2006. This suggests that many investors feel comfortable with the Islamic structure and the Shari'ah based issue is gaining a wider appeal outside the Muslim world. Moreover, between

2002 and 2007 the global sukuk issuance increased sharply from US\$980m to US\$31,908m, and it is expected to keep increasing in 2008 (Alvi, 2007).

However, in order to fulfil this expectation, the issues related to Islamic bonds should be addressed by the relevant parties, which include government, Islamic scholars or supervisory boards, issuers and investors. Fortunately, there are already a number of attempts to solve problems related to the regulatory system, financial environment and supply of scholars and knowledge of Islamic bonds. Netta Thakur (2007) and Julia Berris (2007) point to the many UK companies that have opened Islamic banking and financial brokerage desks in order to create liquidity in the UK Islamic bond market, increase the growth of secondary markets and ensure equality between Islamic bonds and conventional bonds. Moreover, the UK treasury has passed Islamic finance legislation, and UK financial bills have attempted to remove tax penalties for sukuk issuers. Another example, given by Chris Wright (2007), is that in order to increase professional growth with regard to Islamic finance, the government of Malaysia invests in training institutions and prohibits two banks from having the same scholar.

From the literature referred to above, it can be observed that the availability of knowledge and scholars on finance and business in general, and on Islamic law and Islamic finance in particular, can support economic success. It can also help the development and public acceptance of financial instruments, not excepting Shari'ah based instruments such as Islamic bonds. Conversely, as explained by Netta Thakur (2007), the lack of awareness and availability of Shari'ah products, and the absence of trained Islamic scholars and lawyers, will prevent the development of the Islamic market.

The situation explained above represents the motivation and background for the dissertation. This study is intended to contribute to the enhancement of knowledge about Islamic finance in general and Islamic bonds in particular, especially those Islamic bonds based on leasing, which are also known as Ijarah sukuk. The discussion will focus on Ijarah sukuk pricing, and on a review of the literature concerning Shari'ah and financial

issues related to the instrument, as a basis to construct a financial model to price it. It is expected that the writer will be able to give a new perspective on what is deemed by Abdul Manaf (2007) and Julia Berris (2007) as the most popular instrument among the various types of Islamic bond. Thus, it will add to the knowledge about financial instrument pricing in general and Ijarah sukuk in particular. Moreover, it is hoped that the findings will be seen as profitable reference material for educational and business institutions in terms of knowledge development and application, and further research about valuation of Ijarah sukuk or other Islamic financial instruments. Finally, it can contribute to improving the economic conditions in Moslem countries in general, but most particularly in Indonesia.

Methodology

The Islamic bond, or sukuk, is an investment certificate which allows investors to claim ownership of underlying assets (Manaf, 2007). The Islamic bond must follow the principles of Shari'ah law, which include the avoidance of riba. In Islamic terminology, riba means an increase in liability or extra earning obtained free of exchange, as with the payment of interest. Therefore, Islamic bonds differ from conventional bonds, which require issuers to pay regular interest payment to the bondholder as well as a principal at the expiry of the bond. Instead, interest is replaced by a sharing of revenue generated by the underlying asset, and at the expiry date the sukuk holder receives a payment from ownership sales to issuers. This transaction is not a riba, because the payments from revenue sharing are not fixed but depend on factors such as the success of the project and the revenue from using assets (Ebrahim, 2000).

There are seven types of Islamic bond, according to the model of financing and trades which structure the bond (Manaf, 2007). These are:

1. Mudaraba/ muqarabah sukuk
2. Musharaka sukuk
3. Ijarah sukuk
4. Murabaha sukuk

5. Salam sukuk
6. Istisna sukuk
7. Hybrid sukuk

In this dissertation the discussion will focus on the design of Ijarah sukuk, the most common type of Islamic bond. As explained by Manaf (2007) and Berris (2007) an increasing number of companies in many countries are now issuing this kind of sukuk, with leasing as the underlying asset.

The methodology is centred on Shari'ah issue and financial issue of Islamic bonds based on leasing. In the first chapter, the writer attempts to explain the Islamic finance system and its obligations to follow Shari'ah law and Ijtihad, and to be free of riba, gharar and maysir. The second chapter gives an overview of Ijarah sukuk, i.e. an Islamic bond based on leasing. In the third chapter, the financial issue and mathematical modelling used as a basis to price Ijarah sukuk will be discussed. The models used to support the Ijarah sukuk pricing are formulae concerning:

1. Leasing (Schallheim, 1994; McConnell and Schallheim, 1983) and MDB model (Myers, Dill and Bautista, 1976)
2. Formal mortgage system (Ebrahim and Ahmed, 2008) and
3. Cost of capital in a non-interest economy (Mirakhor, 1996).

The final chapter will discuss the valuation of Ijarah sukuk and present an example to illustrate the use of the pricing structure.

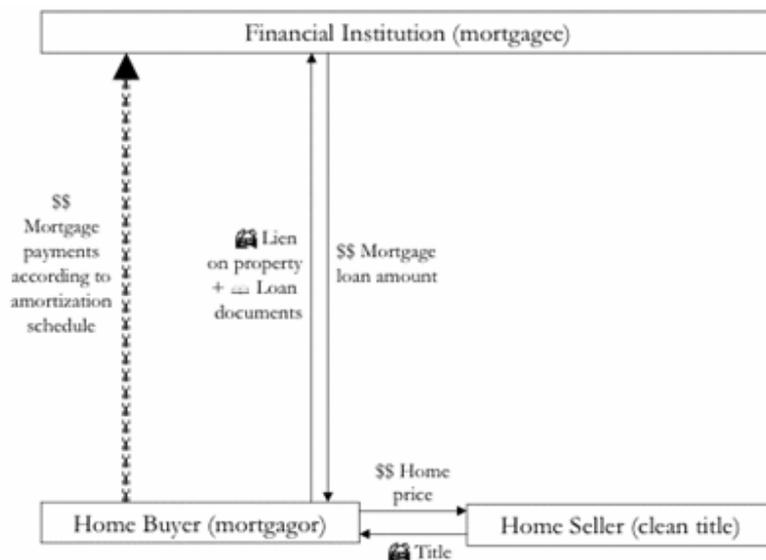
1. An Overview of Islamic Finance

From the middle of the nineteenth century, almost every Muslim country was under direct or indirect pressure from Western domination. They adopted laws and legal systems based on the Western model, particularly in the civil and commercial spheres. As explained above, a millennium ago, the Middle East was economically advanced with respect to standards of living, technology, agricultural productivity, literacy and institutional creativity. However, in the 18th century there was backwardness, and the Middle East was dominated by Western countries that were well-equipped to mobilize and accumulate capital, whose commercial and financial systems were sophisticated and durable, and whose court systems were better suited to handle issues among companies. When finally Muslim countries gained their independence from Western powers, they began to adopt codes deferential to Islamic law, although much still remained of the form and substance of the Western codes. Eventually, many Muslim attempted to restore the Islamic law as national law (Vogel & Hayes, 1998; Warde, 2000; Timur Kuran, 2003, 2004).

In Islamic banking and finance, there is no secularization of religious law. The objective and operations of the Islamic financial institutions are based on Islamic principle and Shari'ah compliance, and they also seek to apply the religious law to a sector of modern commerce, which differentiate them from their conventional counterparts. A standard Islamic contract has to abide by the Qur'an, Hadith and Ijtihad and simultaneously by the law of the land (jurisdiction). The relevant Islamic principles are avoidance of riba, gharar and maysir (speculation, betting and gambling), focus on halal (rightful, legal by Islamic law) activities and the quest for justice and other ethical and religious goals. For every transaction or issuance of an instrument, companies should report to Shari'ah boards, which will analyze the permissibility of the instrument or transaction. Whenever the Shari'ah boards forbid a conventional practice, they will give suggestions on practices that follow Islamic law and Shari'ah, and the Islamic financial institutions

should modify the practice accordingly (Ebrahim and Joo, 2001; Ebrahim, 1999, 2000; Warde, 2000; El-Gamal, 2002; Vogel and Hayes, 1998; Jobst, 2007).

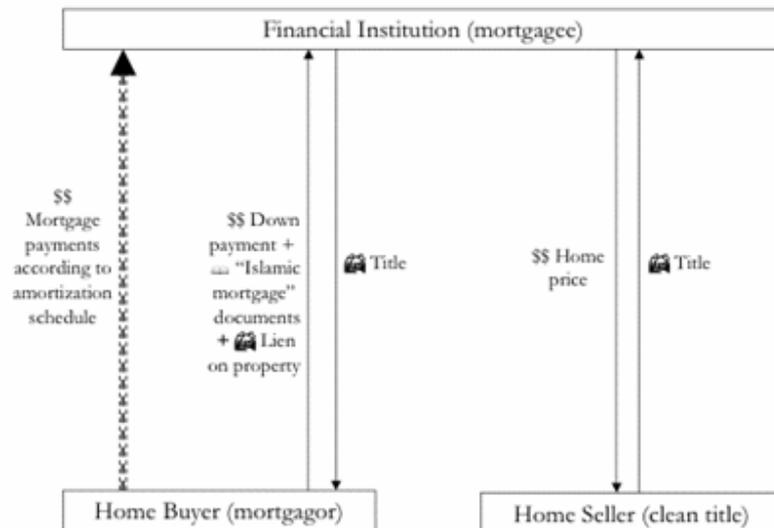
The Islamic financial system can be operated through the development of profit and loss sharing mechanisms which reduce pressure on extreme economic output, and by using alternatives to interest such as fixed service charge or acting as buying agents for clients (Ebrahim and Joo, 2001; Warde, 2000). We can see an example of the first of these two systems in the investment agent- investor relationship between a bank and its client. An Islamic bank will not charge its client any interest, but will engage instead in profit sharing contracts. Fixed costs can endanger borrowers, leading to bankruptcy and structural impairment of the economy, since in bad economic conditions borrowers are still required to pay high interest, regardless of their business circumstances. An example of the buying agent system can be illustrated by comparing the conventional mortgage system and the Islamic mortgage system, as explained by El-Gamal (2002).



Source: El-Gamal (2002)

Figure 1: Juristic Characterization of Mortgage Loan

In this conventional mortgage system, a home buyer borrows money from a financial institution to buy a house from a home seller. The home buyer will give a lien on property and mortgage document to the financial institution. For the term of the mortgage contract, the home buyer will make mortgage payments to the financial institution based on the amortization schedule. In this contract, there is a separation between the loan and the sale contract, so it is considered as *riba*.



Source: El-Gamal (2002)

Figure 2: *Murabaha* Alternative for Home Finance

However, in the Islamic mortgage system, *Murabaha*, the financial institution buys the house from the home seller and sells the house on credit to the home buyer, with amortization tables that calculate from the same interest rate as the conventional mortgage system. The difference here is that the home buyer is involved in a credit sale contract rather than a loan contract, and this contract is considered permissible by Islamic jurists.

1.1. Islamic Law

The principle of the Islamic religion can be visualized by a pyramid. At the top stands the Qur'an, which is considered to be the word of God passed on by the Prophet Mohammed. Below it stands Hadith and Sunnah, terms which are often used interchangeably. Hadith is a set of texts related to stories about the Prophet, his words, deeds and sayings (specific pronouncements, or approvals of other people's actions). Sunnah is a tradition established by those words and deeds, comprising practice and rulings concluded from Hadith. The immutable Divine Law revealed in the Qur'an, Hadith and Sunnah is called Shari'ah (Vogel & Hayes, 1998; Warde, 2000).

For issues not addressed by these primary sources, the proper Islamic view can be obtained from Ijmaa and Qiyas. Ijmaa is a consensus, based on the notion that the teachings of Muslim scholars of a particular age provides assurance of freedom from error. Qiyas is reasoning by analogy or logical inference based on the primary sources (Vogel & Hayes, 1998; Warde, 2000).

The increase of Islamic militancy and the economic development in Muslim countries, especially the oil producing countries, are two factors which make it increasingly necessary to give further consideration to economic conditions. The creation of research institutes and the support for an ijtihad designed to update Islamic beliefs have resulted in countless attempts to define a system which is internally consistent and faithful to Islamic principle, and can be adapted to the contemporary world. Ijtihad is an Islamic ruling derived from jurists' devout and careful reflection and effort. It is a deviation from the revealed text of the Qur'an and the Prophet's Sunnah and Hadith, based on a consideration of how the Prophet and his immediate successors would have acted or what the accumulated wisdom of the community would prescribe. This method is increasingly being used in Islamic banking and finance, particularly when a legal instrument is

considered novel, but also for evaluating and modifying existing conventional financial or banking practice (Vogel& Hayes, 1998; Warde, 2000).

When jurists are unable to speak in a single voice on a particular problem, modern Islamists settle for majority-based decisions. They realize that to gain acceptance for their opinion and to deal with the many complexities of the questions submitted, they must act as a group. In a new twist to the old doctrine of ijmaa (consensus), scholars have been engaging in a group or collective ijihad. Assembled in convocation, scholars discuss collectively and decide questions with a majority vote (Vogel& Hayes, 1998; Warde, 2000).

The concept of group or collective ijihad is also important to individual Islamic financial institutions. Whereas Islamic banks used to rely on single scholars, they now form Shari'ah review boards made up of several scholars. The Shari'ah boards are charged with assisting the development and marketing of Islamic financial products and services, such as certification of products' compliance with Islamic law. They also participate in conferences, workshops and publications on writing and research about Islamic products, and their function has expanded to encompass control and audit of Islamic accuracy. The boards utilize the techniques of financial audits to enforce Shari'ah compliance and report periodically to shareholders with regard to the banks' implementation of Islamic procedure. Every collaborative activity increases the momentum and coherence of intellectual work, and enhances the credibility of Islamic finance (Vogel& Hayes, 1998; El-Gamal, 2002).

In addition to the Shari'ah Boards and Islamic jurists, the Islamic finance institutions also require the help of lawyers and the regulatory arbitrage that supports Islamic products entering the market. Lawyers ensure that the product re-engineered by the Shari'ah Board is compatible with the legal and regulatory system, and compare and contrast risk allocation to financier and customer, so that the Islamic product resembles the conventional product. Lawyers also ensure product efficiency related to legal fees, cost of incorporation and taxation, and the integration of the

special purpose vehicle (SPV) for various Islamic structures and efficiency (Vogel & Hayes, 1998; El-Gamal, 2002).

1.2. Shari'ah Arbitrage

The starting point of Islamic product formulation is the conventional financial practice. Islamic finance will modify the conventional practice whenever it is forbidden by Shari'ah principle, a process characterized by Shari'ah arbitrage. According to El-Gamal (2002) Shari'ah arbitrage proceeds in three steps:

1. Identification of the financial product that is considered contrary to Islamic law (Shari'ah)
2. Construction of an Islamic product that is analogous to the conventional product. Here it is crucial to find an Arabic name for the Islamic product. For the leasing transaction for example, instead of "leasing", the term "Ijarah" is used.
3. The Islamic financial structure marketed under an Arabic name must be analogous to the conventional structure it is intended to substitute.

To replace the conventional product with an Islamic product, it is necessary to create SPV, or additional or superfluous financial transactions, which increase the transaction cost and decrease efficiency. Therefore, this process should be subject to examination as regards the trade off between efficiency and credibility of products, and the target Islamic financial market.

1.3. Prohibition

Islamic finance is an industry based on prohibition of riba and gharar. However, some contracts that contain riba or gharar are permitted in canonical and juristic texts, based on a comparison between these elements and the gain obtained from the financial activities. For example, although credit sales can easily be used as vehicles for riba, these transactions are permitted by Islamic jurists, because the consumption of goods against claims to future income outweighs the danger of abuse. In other words, the

cost of the transaction is much lower than the benefit. Therefore, cost-benefit analysis, or balancing economic freedom against the risk of abuse, i.e. allowing more contracts to enable more economic activities, is important in Islamic finance.

1.3.1. Riba

Debate related to riba encompasses many aspects, such as comparison between interest and usury, and discussion of the inflationary nature of contemporary economies. Interest is a moderate, economically justified compensation of capital, while usury is an extreme, sometimes extortionate rate. Some Islamic scholars state that only usury should be considered as riba, but the majority maintain that any increase in the amount of money returned by a borrower is riba. The issue of inflation also adds to the discussion, since some scholars believe that the prohibition of riba applies to the real interest rate (i.e. the nominal interest rate minus the rate of inflation) rather than the nominal interest rate. The absence of interest rate in inflationary periods will result in a negative interest rate for the lender, thus penalizing lenders and subsidizing borrowers (Warde, 2000).

From Warde (2000), Vogel & Hayes (1998) and El-Gamal (2002), it can be concluded that there are three types of riba:

1. *Riba al-fadl* or *riba* of excess. This arises from trading goods of the same genus and kind in different quantities; for example, an exchange of good quality fruits with a larger quantity of poor quality fruits. However, the Prophet allows this transaction if it is performed through the medium of money. Barter with excess is also permissible if the genus of the goods differs; for example, an exchange of wheat and dates.
2. *Riba al-nasi'a* or *riba* of delay. This arises where there is a delay to the completion of an exchange. However, the delayed sale is not permissible if one asset is a ribawi mal which is currency, gold, silver, etc.

3. *Riba al jahiliyya* or pre Islamic *riba*. There is no prohibition on exceeding the price in a sale on credit for an equivalent present sale, thus providing a compensation for postponement of payment. Moreover, classical and modern Islamic scholars acknowledge that goods sold for cash will be priced lower than goods sold on credit. Therefore, *riba al jahiliyya* does not mean a prohibition of a charge for extending credit *per se*. This *riba* is a pre-Islamic practice of extending delay to debtors in return for a raise in the principal at maturity, so that the principal is doubled or multiplied. It also involves charging the debtor any penalty for failure to pay when due, although the delay is considered as a sin and may be punished as a crime.

Although Islamic law permits compensation for delay in the form of a credit sale that makes the price higher than goods sold for cash, El-Gamal (2002) states that there is *riba* in every loan that attracts a benefit, and every exchange of money for more money in future due to interest. According to the Islamic religion, in a case where the borrower takes longer to repay the loan than was originally agreed, the lender is not allowed to find compensation for the delay in repayment. In other words, to charge extra money for the delay. Therefore, Islamic jurisprudence excludes lending from financial dealings, and thus excludes credit sales. This is possible, because every financial result obtained from commercial lending can be achieved from another form of commutative lending such as sale, lease or *Ijarah* (Warde, 2000; Vogel & Hayes, 1998; El-Gamal, 2002).

The reason behind the prohibition of lending is related to human behaviour towards credit. Well documented psychological and behavioural economic researches suggest the inconsistency of humans towards saving, spending and borrowing behaviour. If left to their own devices, people tend to abuse their access to excessive borrowing without proper consideration. The prohibition on *riba* is intended to protect individuals from taking on excessive debt and becoming subject to unfair payment terms from the extension of credit. Secular regulation could prevent individuals from excessive debt, but tends to be concerned only about the general health of

the financial system, while bankers are mainly concerned with their own profitability. Therefore, these potential sources of protection will generally allow hazardous and excessive debt as long as it does not endanger the overall systematic well being, and on condition that the expected rate of repayment is sufficiently high to ensure the banks' profitability. Consequently, measures supplementary to those imposed by regulators and bankers are needed to protect individuals from their irrational behaviour (Warde, 2000; Vogel & Hayes. 1998; El-Gamal, 2002).

There have been a number of attempts to rationalize riba, in order to understand its laws and to identify its root. These are discussed by Warde (2000), Vogel & Hayes (1998) and El-Gamal (2002), and include:

1. Mathematical equivalency

Riba is prohibited by Islam in order to achieve fairness of exchange by insisting on mathematical equality. Value in monetary terms is often used to determine the equality of different goods. If the exchange goods are not equal, one way to achieve equality is through the medium of currency, since the purpose of currency is to provide a neutral measure of value. However, monitoring the price of every good is difficult to achieve. Therefore, the prohibition relates only to inequality in exchanging fungible goods or goods that can be measured by weight, volume, length or number.

2. Avoiding commercial exploitation

Riba is considered exploitative because it is likely to favour the wealthy, who receive a guarantee on return at the expense of the vulnerable, who assume all the risk. In the case of riba al jahiliyya, Qayyim al Jawziyya stated that this is a "pay or increase" transaction where the debtor is obligated to pay an increase in the debt. This is a mistreatment of the person who needs money or a commodity, because only a needy person would pay additional charges for a mere extension of time. Therefore, the Qur'an draws a distinction between profit from trade and riba. Profit from trade is advantageous for

society and improves welfare. However, profit from riba contributes to illiquidity, scarcity and non productive outcomes.

3. Minimizing commerce in currency and foodstuffs

According to Ibn al- Qayyim, money must not be dealt as a commodity because it should be kept as a neutral measure of value, and because trading money leads to fluctuations in the value of currency and to monetary uncertainty. Moreover, trading goods for larger amounts leads to shortages in the spot market for those goods. This can be dangerous for foodstuffs, which are a basic need of mankind. Therefore, money and foodstuffs should be treated as neutrally as possible and kept stable in value.

4. Linking lawfulness of gain to risk taking

The classical legal maxim that influences Islamic commercial law is that "Gain accompanies liability for loss". Therefore, gain is ethically acceptable only when one faces risk to secure it. In interest bearing loans, the lender is secured from the risk of losing his profit or his capital by the fixed interest charged to the borrower. Therefore, when one party is guaranteed (at least in a contract) to get a fixed value gain, concern about riba is heightened.

5. Using money and markets to allocate and moderate risks

As explained above, a transaction where there is inequality between goods is not acceptable, unless it uses the medium of money. By using the market and money, the balance of the parties' risk becomes reasonable because both parties can use market knowledge to achieve a fair exchange.

The rationalization above is not completely satisfactory; however it does offer something toward fiqh, that is, the study of the law in Islam.

The literal meaning of riba is increase. Riba does not only concern interest rate and is not exclusive to it. Furthermore, even the most conservative jurists do not consider that all forms of interest can be categorized as riba. According to El-Gamal (2002), Warde (2000), Ebrahim and Joo (2001) and Vogel & Hayes (1998), riba is an unfair trade based on

force and involving manipulation, and also refers to any illegal gain derived from the quantitative inequality of the values between exchanged goods. Unfair trade also occurs when the incremental value of a risk free fixed interest loan is independent of the future value of the financed project. This is considered an unfair trade because the lender legally assures his capital and premium to maturity without being subjected to any risk. As explained before, Hadith forbids any form of lending that charges interest to the borrower; therefore, financial instruments must be carefully structured for any exchange that involves goods or partnership shares for money over time.

1.3.2. Gharar

Terminologically, gharar can be interpreted as deception or delusion. The word also means peril, risk or hazard. In the financial context, it is usually translated as uncertainty, risk or speculation, as explained in Sunnah. Sunnah bans risk affecting the existence of the object of the transaction, rather than just its price. More accurately, gharar refers to aleatory financial contracts which contain uncertain events or deception based on the absence of knowledge or the unlikelihood of delivery, with the probability of causing harm (Ebrahim and Joo, 2001; El-Gamal, 2002; Warde, 2000; Vogel & Hayes, 1998).

The Qur'an also contains a prohibition against maysir, a contract that includes gambling or speculative elements and which refers to expected gains which are nevertheless unspecified or otherwise unclear. Such contracts are banned because they cause enmity and distract the faithful from worship (Warde, 2000; Vogel & Hayes, 1998).

Frank Vogel (Vogel & Hayes, 1998; Warde, 2000) described the different degrees of risk, as follow:

1. Pure speculation

This is an intentional gambling transaction, where the value of the sales is totally unknown.

2. Uncertain outcome

The counter-value is an uncertain value and it may not be realized because the sale goods are not yet in possession, as for example with a sale of fish as yet uncaught. The risk can be avoided by arranging a sale conditional, whereby the transaction is valid when the goods meet a certain predetermined quality or – to take the example of the fish – the fish are available and of the same type as the fish specified in the contract.

3. Unknowable future benefit

This occurs when the future benefit to buyers is unknown, even though they transfer valuable benefits that are precisely known and defined. This transaction can be infected with gambling, especially when the buyer has false hopes or pays too much for the transaction.

4. Inexactitude

This is the element with the least degree of gambling or risk. It relates only to inexactitude in cases such as sales of goods that have not yet been weighed.

In Hadith, risk can appear because of the parties' lack of knowledge about the object, because the object does not yet exist, and because the object evades the parties' control. These three eventualities can be used to identify whether the transaction is infected by certain types of risk which are deemed as gharar. However, in recent years there has been a new approach towards risk, whereby the risk can be measured by using past transactions, probabilities and other quantitative methods. Therefore, rather than avoiding risk, financiers can learn to control it, a development which makes risk management critical (Warde, 2000; Vogel & Hayes, 1998).

It is impossible to obtain complete clarity in the language of a contract, so the possibility of risk and uncertainty will always exist. Therefore, jurists differentiate minor gharar, which is tolerable, from major gharar, which invalidates the contract. Conditions that would lead to such an invalidation include excessive gharar in commutative financial contracts such as sales. To invalidate the contract, gharar must affect a principal

component, such as the price or the object of sale. For example, while the sale of a pregnant cow would be allowable because it is the adult animal that is the object of sale, the sale of an unborn calf would not, because the status of the object of sale, the calf, still contains great uncertainty and risk (El-Gamal, 2002).

The difference between minor and major gharar and the consideration of conditions that can invalidate a contract suggest that robust cost benefit analysis is used as a foundation for prohibition. Classical jurists highlighted the central elements of cost benefit analysis as follow: The Prophet forbids gharar sales, that is sales which contain gharar as the major component and thus make the sale imperfect. However, it is possible to allow transactions even where gharar exists. Gharar is permissible if it cannot be avoided without excessive cost or when the gharar is trivial. As long as the transaction does not result in dispute or hatred, or wrongfully jeopardise the wealth of either party, jurists allow a small degree of uncertainty and risk (El-Gamal, 2002).

2. An Overview of Ijarah Sukuk

2.1. Islamic Bond (Sukuk)

A bond is a long term obligation in which the issuer borrows money from bondholders, promising to pay the bondholders interest or regular coupon payments and to repay the principal at maturity. However, in Islamic finance interest or usury must be avoided. Furthermore, with a conventional bond, neither the issuer nor the holder is concerned whether the proceeds are to be used for a halal transaction. Bonds issued by high leverage companies are considered risky for Muslims, as they might contain elements of gharar and may lead to maysir. In conventional bonds there is exploitation of interest rate movement, and the bond risk is assessed not by the bondholder, but by a third party rating agency. Therefore, it can be said that the bondholder's only concern is the return, without any consideration of the use of the proceeds (Shahrim, 2006.; Al-Amine, 2001).

Bond issuance and trading are important elements in modern economic systems, for companies and for government institutions. Such trading can reduce conflict of interest between management and shareholders; give signals as to a company's private information, i.e. a good company usually has high debt but a company with bad prospects has less debt; strengthen the transmission mechanism of monetary policy through the use of the government securities market; increase the efficiency of investment and financing decisions, and improve the efficiency of the design and implementation of monetary policy, risk management, liquidity management and foreign exchange risk management (Ebrahim, 2000; Khalid, 2006; Al-Amine, 2001). Therefore, Islamic scholars have attempted to construct bonds that are analogous to conventional bonds, but which follow Shari'ah principal. As explained in Chapter One, there are 7 types of sukuk; however, this discussion is limited to the most common structure of Islamic bond, the Ijarah sukuk or sukuk with leasing as the underlying asset (Manaf, 2007; Berris, 2007).

The literal meaning of sukuk is a written document. In the middle ages, Muslim society often used sukuk in the form of a paper to represent a financial obligation originating from trade and other commercial activities. Nowadays however, the term sukuk is used to denote something similar to the conventional concept of securitization. Sukuk or Islamic Bonds are investment certificates that represent ownership of underlying assets transferred to the large investors as the sukuk holders. Because investors claim underlying assets as well as cash flow, they gain revenue share generated by the sukuk asset. Sukuk is Shari'ah compliant, and as such there is no interest. Instead, the revenue shares of the assets are paid regularly by the issuer and at the bond expiry date the principal is substituted by the sale price of asset ownership. Information regarding the use of the sukuk proceeds is given to the sukuk holder to eliminate the elements of speculation and uncertainty in the transaction. Usually, the money raised from the sukuk issuance is used to invest in the underlying asset (Clifford Chance, 2008; Ayub, n.d.; Manaf, 2007; Jobst, 2007; Shahrin, 2006.).

Over the past six years, sukuk has evolved to become a viable form of capital market based on Islamic structured finance, which merges the concept of securitization and the principles of the Shari'ah law on the provision and use of financial products and services in a risk-mitigation structure subject to competitive pricing. The issuance of Sukuk has undergone rapid increase; for example, up to 2006, London based financial institutions had arranged more than a dozen Sukuk issuances on behalf of Middle Eastern clients, while in 2008 Indonesia will increase the sale of both conventional and Islamic bonds in order to generate a domestic source of finance to solve its financial deficit (Emergingmarketsmonitors.com, 2007; Jobst, 2007:19 ; Alvi, 2006, 2007). As seen in the graph below, the global sukuk issuance in 2007 was US\$ 31,908 billion, 94.96 times greater than the sukuk issuance in 2000. Alvi (2007: 9) estimates that by 2010, it will have increased as follows:

- Conservative : US\$ 125 billion

- Pessimistic : US\$ 180 billion
- Optimistic : US\$ 225 billion.

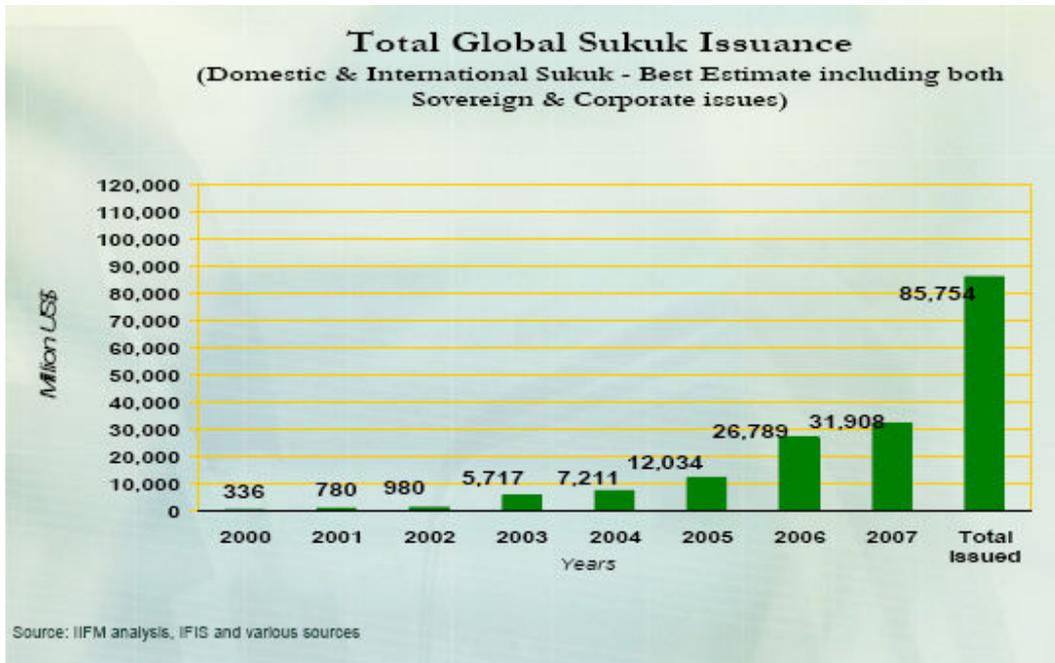


Figure 3: Total Global Sukuk Issuance

2.2. Ijarah (Leasing)

As mentioned above, the focus of the discussion is on Ijarah sukuk, the type of sukuk based on leasing as the underlying transaction. To provide the background to the discussion this section will begin by describing conventional leasing. Next, Islamic leasing or Ijarah is explained, and the differences between Islamic and conventional leasing practice are explored.

2.2.1. Conventional Leasing

A lease is a rental agreement that gives the lessee the right to use the asset and the obligation to pay a series of fixed payments to the lessor, the asset owner (Brealey et al., 2006; Ross et al., 2005; Megginson et al., 2007; Pike & Neale, 2006). The advantages of leasing over borrowing money or buying assets include tax savings, pure financial cost savings, transaction and information cost savings and risk savings (Ross et al., 2005; Pike & Neale, 2006; Schallheim, 1994). With reference to the tax savings, Schallheim (1994: 3) states that "The essence of leasing can be captured in a single sentence: Equipment leasing provides customized financing with potentially unique tax features." In most leases, the lessor holds ownership of the leased asset, and will therefore be able to deduct the tax shield from the depreciation of the asset.

The pure financial cost savings of leasing are related to earnings, cost of financial distress and bankruptcy, off balance sheet financing and capital expenditure constraint. Leasing will impact on earnings, because the cash flow of leasing is lower than that of purchase financed by borrowing. This is because in the early years the lease payments for the leasing option will be lower than the amount of interest payments minus depreciation in the purchase with borrowing. Leasing can reduce the cost of financial distress and bankruptcy, since when the lessee defaults, or in cases of financial distress and bankruptcy, the lessor has higher priority than other creditors. Furthermore, when companies report their lease transaction as an off balance sheet financing, their smaller debt ratio compared to companies that

use debt to finance their asset acquisition makes them appear financially stronger. Finally, for institutions such as authorities and governments, which are subject to capital expenditure constraints, with limited borrowing power and restricted capital acquisition but with slack operating budgets, leasing allows them to use an asset without the necessity to borrow money to buy it.

Leasing also offers transaction and information cost savings. For example, a lease that includes a maintenance agreement will carry a lower transaction cost than purchasing the asset with a separate maintenance contract, since it avoids the necessity for the lessee to find another company to provide the asset maintenance service. This reduces both transaction cost and the information cost incurred by finding the right company to maintain the asset, and negotiating and finalizing the maintenance contract. In some cases a maintenance service is tied to lease payments with a metering system. For example, the lease payment of a photocopier machine is related to the quantity of paper copied. If the machine breaks, both parties will suffer: the lessor will lose their income from lease payment, and the lessee will be unable to use the machine. Such a system can reduce the transaction cost of asset maintenance; for example the monitoring cost for the lessee will be lower, because the quality of service provided will influence the lease payment given to the lessor.

Finally, leasing allows the sharing of residual value risk and inflation and business risk. The lessee can transfer residual value risk, that is risk of the asset market value at maturity date, to the lessor, who adjusts lease payments to cover it. Lease payments will be reduced if the lessor can gain advantage from the secondary market of the used asset. That is, if the lessor can sell the asset at maturity to the secondary market with a high value, (s)he can reduce the lease payment charged to the lessee. Inflation and business risk can also be reduced, especially with leases that include a metering agreement. Furthermore, lease payment can offer a hedge against business risk, because it fluctuates according to a store's sales (Ross et al., 2005; Pike & Neale, 2006; Schallheim, 1994).

Types of Leasing

The two basic types of lease are operating lease and financial or capital lease (Brealey et al., 2006; Ross et al., 2005; Megginson et al., 2007; Pike & Neale, 2006; Schallheim, 1994). The operating lease is considered short term, because it only lasts for up to 5 years. It is not amortized, because the term is shorter than the expected life of the asset. The present value of lease payment is lower than the purchase price and at maturity the asset still has significant market value; therefore, the lessor can recover the cost of the asset by renewing the lease or selling the asset to realize the remaining asset value. In this type of lease, residual value plays a major role for the lessor's rate of return. An asset that has high residual value has a high sale price and impacts on the lease payment. Therefore, residual value is very important and accurate estimation is crucial for the operating lease. The lessee has a cancellation option, but normally (s)he has to pay a cancellation fee to the lessor. The lessor can use insurance to protect against residual value risk and cancellation risk.

The financial lease is in complete contrast to the operating lease in terms of residual value risk, transaction cost, maintenance commitment, and contract option. The lessee has to cover all property tax, sales tax, user tax, maintenance and service cost and (s)he usually has the right to renew the lease. The duration of the lease is close to the estimated life of the asset, and the total present value of lease payment is higher than the initial cost. Therefore it is fully amortized and cannot be cancelled; otherwise, the lessee would face a risk of bankruptcy.

The methods of lease are direct lease, sale and lease back and leverage lease (Brealey et al., 2006; Ross et al., 2005; Megginson et al., 2007; Pike & Neale, 2006; Schallheim, 1994). With a direct lease, the lessor buys the asset and leases it to the lessee. With sale and lease back, a company sells an asset to the lessor and leases it back, so the lessee gains money from the asset sale and the lessor is compensated by periodic payments from the lessee. This method is attractive to companies that need money for their operational activities, because the lessee receives funds

which reflect the current market price and use it for production purposes. The new owner or lessor assumes all rights and benefits of ownership, such as tax benefit of depreciation, tax credit and residual value.

In a leverage lease, the lessor buys the asset and leases it to the lessee, but (s)he pays only a small fraction of the purchase price, and the remaining payment is handled by a lender who puts up more than 50% of the purchase price and receives interest from the lessor. The lender is protected by first lien of assets and gets periodic payment from the lessee if the lessor defaults. This method is popular for very expensive assets.

According to McConnell & Schallheim (1983), there are seven characterizations of asset leasing contract:

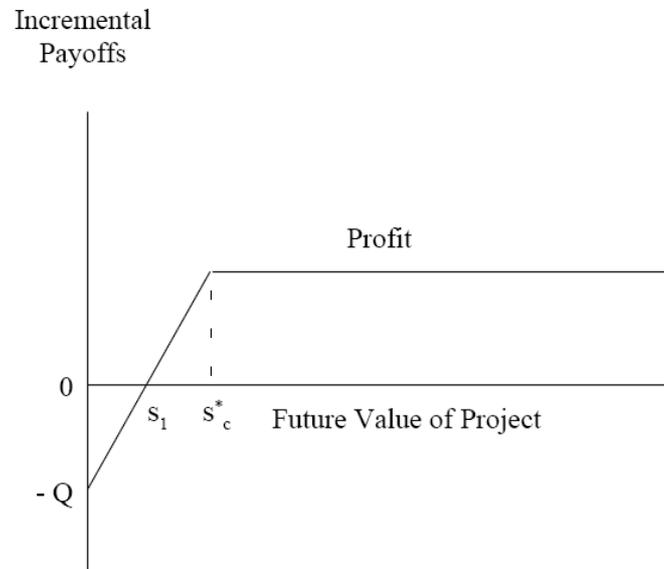
1. Cancellable operating lease or standard operating lease:
This is the same as the operation lease described above.
2. Lease with option to extend the maturity date of the contract:
This is an operating lease, but at maturity date the lessee has rights (but not obligation) to renew the contract.
3. Lease with option to purchase asset with fixed price at maturity:
This is an operating lease that grants the lessee the option to buy the asset at a fixed price at maturity date. The lessee exercises the option if the market value is higher than the exercise price.
4. Lease with option to purchase asset with fair market value at maturity:
This lease does not have value and the lease payment is the same as in a lease without this option. This is because the lessee could buy the asset from another place at a fair market value, without choosing to buy it from the lessor.
5. Lease with option to purchase asset at a pre-specified price at any time:
This lease usually specifies that the purchase price or the exercise price will decrease according to the lease payments that have been made. However, previous research has found that investors will not exercise an American call option on a non dividend stock before maturity (Merton, 1973, cited in McConnell and Schallheim, 1983).

- Lease with purchase option enables the lessee to use the asset without bearing the downside risk of the residual value. Therefore, if the lessee exercises the asset earlier than maturity, s(he) will lose insurance against the risk. Consequently, as with the American option, a lessee will not exercise the purchase option before maturity.
6. Lease with an asset purchase requirement:
Under open end lease, also known as conditional sales lease, the lessee has to buy the asset at a fixed price and pay collateral. In this lease, all of the lease payments and the fixed purchase price are due upon default. The lessee must pay the lease payment and purchase price immediately when ending the lease before maturity. According to present value analysis, the lessee will be worse off by paying now rather than later; therefore, all payment has to be paid as scheduled.
 7. Lease with non-cancellation period
This can be seen as the standard operating lease, whereby all lease payment will be paid according to a schedule and without the option to cancel. Thus there is certainty regarding the lease and the payment.

2.2.2. Ijarah or Islamic Leasing

Ijarah is an analogy to conventional leasing, whereby Islamic banks or financial institutions act as the lessor, buying the asset and then leasing it to the lessee. The lease payment is determined at the beginning of the contract and paid over the term of temporary use of the existing asset. The object of an Ijarah lease contract is a desirable, known, permissible and accessible usufruct; therefore, it can be seen as the sale of usufruct (Warde, 2000; Vogel & Hayes, 1998; El-Gamal, 2002; Alvi, n.d.; Jobst, 2007; Ebrahim 1999; Ebrahim & Joo, 2001). According to Ebrahim and Joo (2001), Ijarah features both debt and equity. It features debt because Ijarah is similar to an asset backed loan, and it features equity because the wild card in Ijarah is an estimation process of expected salvage value which can be positive or

negative. The payoff of an Ijarah contract can be explained as follows (Ebrahim, 1999, 2000):



Source: Ebrahim (1999, 2000)

Figure 4: Payoff of Ijarah Sukuk

The profit for Ijarah will happen after a critical level of S^*c . If that level is not reached, the Islamic bank will receive a negative discounted return. This transaction is not considered as ribawi, i.e. exchanging money for more money over time, because the payoff is not fixed and is according to factors such as project success.

Ijarah wal Iqtina is an Islamic term for financial lease, and is used to refer to a particular type of Ijarah. The lessor designs a lease payment which contains a fraction of the agreed resale price in the form of a call option premium. Hence, the borrower can gradually obtain legal equity ownership for a predetermined sales price. If the option is not exercised at maturity of the lease transaction, the lender or lessor will sell or dispose the asset to realize salvage value (Warde, 2000; Vogel & Hayes, 1998; Alvi, n.d.; Jobst, 2007; Ebrahim 1999; Ebrahim & Joo, 2001).

As explained before, one method of conventional leasing is sale and lease back. According to Ayub (n.d.), the methodology of sale and lease back

is also permissible by Shari'ah principle. The lessee sells the asset to the lessor and leases it back. In this case the Ijarah contract can not be executed unless and until the Islamic Financial Institution as lessor has acquired the underlying asset. Assets leased under this technique can be sold back to the original owner. This technique is commonly used as an underlying transaction in Ijarah sukuk.

According to Warde (2000) and Vogel & Hayes (1998) conventional and Islamic (Ijarah) leasing structures can be differentiated by three problems that arise in the Islamic law of leasing, related to riba and gharar.

1. The ownership of the underlying asset in Ijarah lies with the lessor. According to Shari'ah principle, the jurists give strict conditions to ensure that the party who receives compensation from a lease based structure (the lessor) should get the material ownership of the asset. Therefore, jurists insist that all repair costs, other than routine maintenance and damage caused by lessee abuse or negligence, are assigned to the lessor. In other words, the responsibility for maintenance and insurance falls to the lessor as the owner of the asset. However, in conventional leasing, the contract can include a maintenance agreement or not, although the maintenance agreement is one of the benefits of choosing a lease arrangement rather than an asset purchase (Warde, 2000; Vogel & Hayes, 1998; El-Gamal, 2002; Jobst, 2007).
2. The asset usufruct is intangible, but the stream of use extending into the future is risky and unstable. Therefore, the Islamic law allows the lessee to cancel the lease if the usufruct proves less valuable than expected.
3. There are several types of future sale and option used in conventional financial lease to dispose the residual value at maturity. Under Islamic law, this agreement should be written separately from the lease agreement (El-Gamal, 2002).

2.3. Ijarah Sukuk

Ijarah sukuk is a security that represents ownership of an equal share in the usufruct of an asset that is well defined, existing and known, tied to an Ijarah contract as defined by Shari'ah. The sukuk gives the owner the right to own the underlying assets, receive rent and dispose the sukuk without any impact on the sukuk issuer's right to use the asset. There are ownership risks related to this instrument; for example owners have to bear all costs related to the basic characteristics of the assets and the lessee is responsible for bearing the cost of maintenance (Manaf, 2007; Al-Amine, 2001; Ayub, n.d., Billah, n.d.).

According to Al-Amine (2001:6), Ijarah sukuk has four characteristics:

1. Ijarah bonds can be traded in the market at prices determined by market forces, such as general market and economic conditions, the financial market, opportunity cost and the price of real investment. The Ijarah bond is also subject to risk related to the ability and desire of the lessee to pay the rental payment, and the market risk arising from the potential changes in asset pricing, maintenance and insurance cost.
2. Due to the presence of maintenance and insurance expenses that cannot be perfectly known in advance, the expected return on some forms of Ijarah sukuk cannot be completely fixed and determined at the beginning of the contract.
3. Ijarah sukuk is completely negotiable and tradable in the secondary market.
4. Ijarah sukuk offers a high degree of flexibility, derived from the approach to issuance management and marketability. The flexibility rules in Ijarah mean that securitization of the Ijarah contract is the key factor to solving the liquidity management problem. Therefore, sukuk has both the characteristics and the necessary conditions to be a successful security.

2.3.1. Ijarah Sukuk Structure

The structure of Ijarah sukuk can be illustrated as follows:

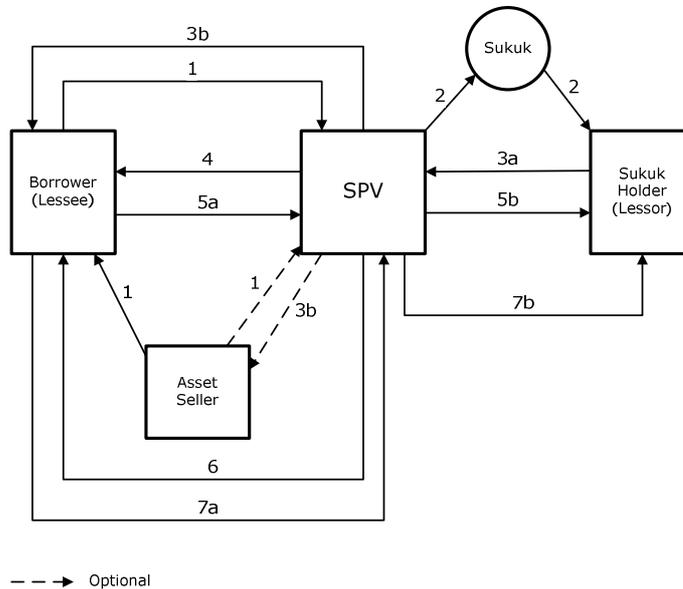


Figure 5: Ijarah Sukuk Structure

1. The borrower buys the asset from the seller and sells it to the special purpose vehicle (SPV). Alternatively, SPV buys the asset directly from the seller according to the needs of the borrower.
2. To pay for the acquisition, the SPV issues sukuk to sukuk holders.
3. a. Sukuk holders pay sukuk proceeds to the SPV.
b. The SPV distributes the proceeds received from sukuk holders to the borrower to pay for the asset acquisition. If the SPV buys the asset from the seller, the proceeds are used to pay the purchase payment to the asset seller.
4. The SPV leases back the asset to the borrower (the lessee).
5. a. As return on the lease transaction, the lessee pays regular lease payments to the SPV.
b. The SPV distributes the lease payment to sukuk holders as the periodic distribution amount; this amount is equal to the lease payment received from the borrower or the lessee.

6. At the maturity of the sukuk, the borrower repurchases the asset from the SPV.
7. a. The borrower pays the repurchase price to the SPV.
b. The SPV distributes the repurchase price received from the borrower to sukuk holders as a dissolution distribution amount.

Another form of Ijarah sukuk is without any SPV or financial intermediaries to issue the instrument. The borrower issues Ijarah sukuk to buy the asset. The ownership of the asset is transferred to sukuk holders while the issuer or borrower becomes the beneficiary of the Ijarah sukuk or the user of the asset. There is no premium paid to an Islamic intermediary, but the issuer might take some contractual compensation from the transaction (Al-Amine, 2001).

At the time of contract, all parties must have full knowledge about the leased asset and the amounts of the lease payment. The lessor can sell the sukuk without any interference in the lessee's ability to take the benefit from the lease asset. The new sukuk holders will receive the remaining lease payment or the periodic distribution amounts. The rental in Ijarah must be predetermined in clear terms at the beginning of the contract and at future renewals; the term can be constant, increasing or decreasing, with benchmarking or relating the term to a well known variable such as inflation rate, percentage, or any periodically announced price index. However, although the mainstream experts permit the use of benchmarking, this practice is still considered not ideal (Ayub, n.d.).

As explained before, SPV is created as an arbiter of transaction (although there are some forms of Ijarah sukuk that do not use an SPV or any financial intermediary). If the lessor in the transaction is an SPV that does not have any material ownership of the underlying asset and does not use it for financing purposes, the lessee will bear all the cost of repair and insurance, through increased lease payments. The reason behind the creation of SPVs can be found in Justice Usmani's statement cited in El-Gamal (2002) that lease based securities should represent ownership of the

asset, complete with all rights and obligations. There is a common misunderstanding that the issuance of Ijarah sukuk only gives the right of the lease payment, without granting the ownership of the underlying asset. In that case, the sukuk holders would not have any relation to the leased asset at all, other than receiving the lease payment from the lessee. However, this type of securitization is not allowed in Shari'ah principle.

Constructive ownership using an SPV, the structure of which transaction is explained in the master lease agreement, are becoming more popular, because legal and banking experts have the freedom to raise objections on the lack of any kind of ownership of the asset. The objective of the creation of the SPV is to satisfy the needs of the market for regular debt instruments, and also to satisfy pressure from jurists on material ownership of the underlying asset, in order to justify the collection of coupon payment from the structured instrument (Al-Amine, 2001).

At the end of the contract, there is a repurchase transaction between SPV and the borrower, who buys the underlying asset. The repurchase agreement should be written in a separate document from the lease agreement contract. There are three forms of repurchase agreement: repurchase transaction with certainty; with call option on the borrowers' side; and hiba or gift (Shahrim, 2006.; Al-Amine, 2001). In Ijarah sukuk, it is possible to have a condition whereby the lessor will give the leased asset to the lessee at maturity as a gift. Therefore, the gift promise is conditional upon the completion of the Ijarah sukuk contract. However, Abu Hanifa cited in El-Gamal (2002) ruled generally that if someone makes a conditional gift, the property belongs to the potential recipient of the conditional gift immediately and is considered as a permanent gift. The recipient can demand the property without the necessity to fulfil the conditional term. In Ijarah sukuk, when the promise is made to give the underlying asset back as a gift to the lessee at maturity, the asset belongs to the lessee or borrower immediately, without waiting until the Ijarah sukuk matures. Therefore, the lessee is not obligated to make any further lease payment to investors or

SPV as the lessor. From this argument, it can be concluded that the compensated resale contract is the most viable option for Ijarah sukuk.

According to the explanation given above, Ijarah sukuk can be considered as sale and lease back, but at the expiry date, the sukuk holder must sell the asset back to the asset owner. Therefore it can be classified as lease with asset purchase requirement, one of the characters of asset leasing contracts explained by McConnell and Schallheim (1983). For this type of lease, the lessee is required to purchase the asset to the lessor for a fixed price at the maturity date. Under this condition, the lease is equal to the standard operating lease with all options including the purchase option that has to be exercised with certainty. However, according to El-Gamal (2002), the sale and lease transaction in Ijarah sukuk is not real, because the core of this structure is the conventional bond. Unfortunately, the unreal sale and lease back method is very expensive, with many legal complications and side contracts for repairs and maintenance. Therefore, from the above analysis, the price of Ijarah sukuk is a combination of the pricing of conventional bonds and leasing, with an element of repurchase transaction at maturity, and transaction costs such as SPV or investment bank's fees, legal fees, maintenance and insurance expenses.

2.3.2. Criticisms of Ijarah Sukuk

There are some disadvantages regarding the Ijarah sukuk structure. Not every potential issuer has access to the needed underlying asset. Ijarah sukuk carries high transaction costs such as maintenance and insurance costs, because Shari'ah requires the asset to be operable, otherwise the lease will be suspended until the asset is fixed; Shari'ah fees and audits which are not only expensive, but also time consuming; and penalties for the lessee or borrower if the lease payment is not paid on time. However, the major criticism is related to the use of interest rate as benchmark, because it is often the case that the return of Ijarah sukuk is benchmarked to LIBOR (London Inter Bank Offer Rate) on US\$ funds, or the equivalent local rate of issue. Although the interest rate is only used for pricing, the close link

between interest-based pricing and riba worries Shari'ah scholars (Sen, n.d.). According to Vogel and Hayes (1998) Islamic scholars do not recognize any difference between nominal and real rates of return. However, in the process of articulating an expected rate of profit for the assumed rate of investment, Muslims end up incorporating implicit inflation assumptions when they set profit expectation as a function of other conventional capital market returns on comparable risk.

Since interest rate is usually used as a basis of cost of capital and a benchmark against interest rate of return (IRR), in an economy without any interest rate there is no mechanism to calculate the cost of capital, and the efficiency of an investment project cannot be evaluated. To solve the problem associated with use of interest rate for pricing the Ijarah sukuk, Mirakhor (1996) suggested a procedure that utilizes Tobin's q in a calculation of the cost of capital and investment. This calculation is done without resort to a fixed and predetermined interest rate; equity financing becomes the only source of financial capital and the economy's financial system becomes equity based.

In an economy without debt, the stock capital is valued in the market for equities and the relationship between the supply price of capital and the rate used by the shareholder to discount the expected future earnings can be derived. Tobin's q defines the supply price of capital as the rate of return which is required by a shareholder to absorb the existing capital stock to their portfolio. Incentive for companies to invest depends on the prospective profitability relative to the cost of capital. Investment is expected to occur when the demand price as reflected in the financial valuation exceeds the supply price as measured by the cost of physical capital. In other words, a company is expected to accept investment where the return will exceed the cost of capital (Mirakhor, 1996).

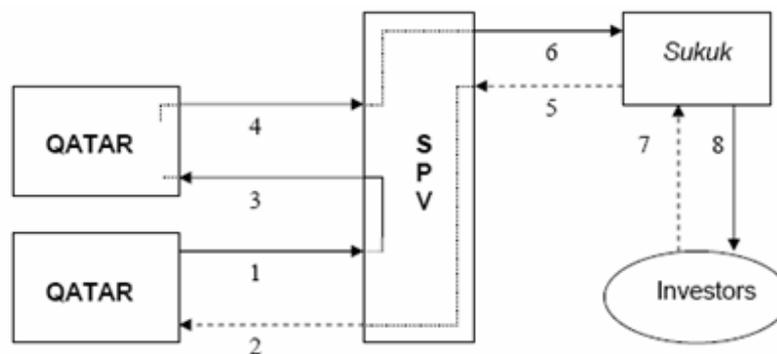
The q theory of investment relates investment to the ratio of market to the replacement value of capital. From the previous observation it can be seen that under certain conditions, the rate of investment of a share-value-maximizing firm is the function of q . Marginal q is the ratio of market value of

an additional unit of capital to its replacement cost. Marginal q is a fundamental determinant of investment, because it shows the increase in the market value of a firm, which reflects the profitability of existing capital (Mirakhor, 1996).

2.3.3. Examples of Ijarah Sukuk Issuance

In practice, there are a number of different structures used for this instrument. Three examples will be discussed here: the Ijarah sukuk issued by Qatar Global Sukuk as illustrated by Tariq (2004); that issued by RH Capital PTC (2004), and the hypothetical case of an Ijarah sukuk issued by a Ministry of Defence, as illustrated by Al-Amine (2001).

The Government of Qatar issued US\$ 700,000,000 Ijarah sukuk through the Qatar Global Sukuk, an SPV established by the government of Qatar, Qatar International Bank and HSBC. The Ijarah sukuk was issued in 2003 and will mature in 2010. The proceeds will be used to finance the construction and development of Hamad Medical City. The Ijarah sukuk structure can be summarized by the graph below (Tariq, 2004):



Source: Tariq (2004)

Figure 6: The Qatar Sovereign Ijarah Sukuk Structure

1. The government of Qatar as a borrower sold a land parcel to the SPV amounting to \$700,000,000.
2. The purchase price was given to the borrower.
3. The borrower leases back the asset from the SPV.

4. The lease payments are given to the SPV periodically, which reimburses these to the sukuk holders. At maturity, the asset will be repurchased by the borrower and the principal given to the sukuk holders (6 and 8).
5. To finance the asset purchase, SPV issues sukuk to sukuk holders and receives the proceeds of the sukuk from them (7).

The lease payments or the periodic distribution given to the sukuk holders is calculated by a floating rate as follows:

- For the first four distribution dates, the lease payments are $(LIBOR + 0.4\%) * (700,000,000) * \frac{x}{360}$
- For the remaining distribution dates, the lease payments are $A + (LIBOR + 0.4\%) * (700,000,000) * \frac{x}{360}$

(x is days in return accounting period, A is an amortization payment).

The second example is from the issuance of RH Capital PTC. The instrument cost RM 85,000,000. The proceeds were used to finance acquisition of Plantation Land and Palm Oil Mills from borrowers. In this issuance the borrowers are multiple, specifically Baram Trading Sdn Bhd (BTSB), PJP Pelita Biawak Plantation Sdn Bhd (PJP), Lubuk Tiara Sdn Bhd (LTSB), R H Selangau Palm Oil Mill Sdn Bhd (RSPOM) and R H Lundu Palm Oil Mill Sdn Bhd (RLPOM). The instrument will be mature at 10.5 years. In contrast to the previous example, the lease payment is fixed and predetermined and allocated among borrowers. In this instrument, the lessee or borrowers get a call option to buy the asset from the issuer at maturity (RH Capital PTC, 2004).

The final example is illustrated by Al-Amine (2001). A hypothetical Ministry of Defence needs money for a training programme. They ask an Islamic bank to issue an Ijarah sukuk to finance the programme and acquire appropriate land on which to run the programme. The Islamic bank buys land for 10,000,000 dinars and rents it to the Ministry of Defence at 900,000 dinars per year. Simultaneously, the Islamic bank issues Ijarah sukuk to sukuk holders. The bank receives issuance commissions of 5% of the asset

purchase price. These commissions lead to an increase in the sukuk price of 10,500,000 dinars, and the sukuk holders will receive periodic distribution amounts from the bank amounting to US\$ 900,000 per year.

From the examples given above it can be seen that the Ijarah sukuk offers great flexibility. The proceeds can be used for several purposes, as long as they follow Shari'ah law. The borrowers can be one company or more than that. The lease payment can be paid to sukuk holders through an SPV or directly, and can be fixed and predetermined or in a floating rate benchmarked by the LIBOR rate, although Shari'ah boards claim that this is not an ideal method of pricing. Moreover, the repurchase asset price at maturity can be pre-specified at the beginning of the contract, or it can be structured as a call option for borrowers to buy the asset at maturity from sukuk holders.

3. Key Papers Guiding Model Development

3.1. Leasing Valuation

3.1.1. NPV Analysis

To evaluate leasing, we can use Net Present Value (NPV) analysis. The lessee saves the cost of buying the asset, but has to pay lease payments from the time the lease contract is initiated until maturity. Lease payments are generally tax deductible, but the lessee gives up the depreciation tax shield and any other tax credit related to ownership, such as tax deductions on interest payments if the asset is bought with borrowed money. The lessee also loses asset residual value. However, the lessor can assume some of the operating cost of the asset, such as maintenance and insurance cost. The valuation of the lease can be explained as below (Myers, Dill and Bautista , 1976; Schallheim, 1994):

$$NPV = A_0 - \sum_{t=0}^{N-1} \frac{L_t (1 - T)}{(1 + r_1)^t} - \sum_{t=1}^N \frac{D_t (T)}{(1 + r_2)^t} - \sum_{t=1}^N \frac{I_t (T)}{(1 + r_3)^t} + \sum_{t=1}^N \frac{O_t (1 - T)}{(1 + r_4)^t} - \frac{S_n}{(1 + r_6)^N} - TC$$

There are 7 terms in the above equation, which are:

1. Savings on cost of sales
2. Present value of after tax lease payment
3. Present value of opportunity loss from tax deduction allowed for depreciation
4. Present value of opportunity loss from tax deduction allowed for interest, assuming the company would have borrowed money to buy the asset
5. Present value savings from after tax operating expense (applicable only if the lease includes an asset maintenance agreement)
6. Present value of opportunity cost for after tax salvage value
7. Tax credit applied to the asset and taken by the lessor.

Most authors agree with the elements stated above. However, there is still a debate as to the discount rate that should be used to calculate present value of the cash flows. Some experts argue that the discount rate should be after tax cost of debt, while others argue that it should be weighted average cost of capital, but the most important thing is that the discount rate should describe the riskiness of the cash flows. If the calculation uses after tax cost of debt, the discount rate is: $r^* = r (1-T)$. However, this discount rate assumes that the company is being financed by 100% debt. According to Myers, Dill and Bautista (1976), in reality it is difficult to find a company that has 100% debt. Therefore, the assumption to calculate the discount rate should be changed. For cases where there is not 100% debt, the calculation of the discount rate is based on the weighted average cost of capital, which is calculated by the Modigliani and Miller formula, so the discount rate is adjusted to: $\rho^* = \rho (1 - \lambda T)$. ρ is project rate with assumption of perfect capital market and all equity financing. λ is proportion of the debt and equity to finance the asset. This formula assumes that the lease payment and tax shield support at most λ debt per asset leased (Myers, Dill and Bautista, 1976; Schallheim, 1994).

One major difference between leasing and borrowing money to buy an asset is the residual value of the asset. In borrowing, the residual value belongs to the borrower. However, in leasing, the owner of the residual value, or the party that bears the residual value at maturity depends on the lease type. For an operating lease that is tax deductible, the ownership right belongs to the lessor; hence, the residual value risk is borne by the lessor. For leasing with fixed purchase option, the lessee will exercise the option if the fixed price is lower than the actual market price. However, if the fixed price is higher than the market price, the lessee will not gain from the option. For leasing with an asset purchase requirement or conditional sales contract lease, the lessee will bear the residual value risk because s(he) owns the asset at maturity. Therefore, in leasing, the residual value can be borne by the lessee or the lessor, or can even be shared through option (Schallheim, 1994).

As seen in the formula above, residual value is one of the elements that influence the lease value. Risk and return of residual value must be evaluated in order to determine the appropriate discount rate for residual value. Factors which contribute to the risk of the residual value are the supply and demand for the asset that give effect to fluctuation of asset market price, and the technology obsolescence that reduces the asset market value when a new asset becomes available. One method to evaluate the risk of residual value is the modern portfolio theory. Because the leasing company will usually hold a well diversified portfolio of sets of assets, the most relevant risk which influences the residual value is systematic or market risk. Capital asset pricing model (CAPM) can be used to calculate the market risk, which is stated by: $r = r_f + \beta (r_m - r_f)$.

r is the expected return on asset

r_f is the risk free rate of return

β is beta or market risk

r_m is expected return on market portfolio

There are three ways to calculate the beta. The first is to measure time series of used asset price, and correlate return with time series return from a market wide index. However, it is difficult to find the time series of the used asset. The second method is to measure beta of the company or group of companies which produce the asset and remove leverage effect to calculate the asset beta. Therefore, the asset beta can be calculated by:

$$\beta_u = \frac{\beta_L}{1 + (1-T) \text{debt/equity}}$$

β_u is unlevered or asset beta

β_L is levered or equity beta

The beta can be estimated by using stock market data with assumption that the company risk is closely linked to the risk of the asset that is produced by the company. However, this method can be implemented only for companies which have earnings mainly from a single asset or type of asset. The final way to calculate beta is to measure beta from a company that uses the

leased asset. Manufacturing and user companies provide good proxies for asset beta (Schallheim, 1994).

3.1.2. Compound Option

As an alternative to NPV analysis, McConnell and Schallheim (1983) use the compound option pricing framework to develop a general model to value each type of lease contract. The valuation assumes that the capital market is frictionless, and that investors are rational and have positive marginal utility of wealth. As explained above, according to McConnell and Schallheim (1983), there are 7 types of asset leasing contract. This dissertation focuses on the model to value the standard operating leasing contract, and explains the method to modify the model to value the lease with an asset purchase requirement, because this lease type can be used to build the model for Ijarah sukuk.

First we discuss the valuation of the standard operating lease. In this type of lease, the rental payment (L) is due immediately when the lease is initiated (at time $t=0$) and is paid periodically until maturity (at time $t=T$). This lease can be seen as a compound option. Each rental payment buys the use of the asset until the next payment is due and also buys the compound option for the next period. For example: rental payment of L for the first period is exercised to buy the usufruct of asset for time $t=1$ to $t=2$ and also to buy the compound option in the second period with exercise price of L . The work of Rubinstein (1976) on valuation of risky income stream, and of Geske (1977) on valuing the compound option, are used to derive the model for the asset leasing valuation (cited in McConnell and Schallheim, 1983).

If L is the current lease payment and L_{T-n} is the competitive determined equilibrium market lease payment from time $T-n$ until T , the lessee pays the lease payment if the $L_{T-n} \geq L$, and cancels the lease and chooses to lease an identical asset from the market if the $L_{T-n} < L$. According to Miller and Upton (1976), the rental on a single period lease will be enough to compensate the lessor for the opportunity cost of capital invested in the

leased asset, and the expected loss in value of the asset because of economic depreciation during the period covered by the lease.

Therefore the equilibrium lease payment for a single period from T-1 until T is:

$$L_{T-1} = A_{T-1} - \left[\frac{1 - E(d)}{1 + r_f} \right] e^{\sigma y} \cdot A_{T-1}$$

A_{T-1} is the market value of the leased asset. $E(d)$ is the expected rate of economic depreciation which can be calculated by $(A_{T-1} - A_T) / A_{T-1}$. σy is the covariance between logarithm of one rate of economic depreciation and 'market factor' y . The boundary condition for this formula is $L_{T-1} \geq L$; otherwise the lease is terminated by the lessee.

If the lease is an n period lease with equilibrium lease payment of L_{T-n} , the lessee has to choose between the lease payment of L or entering n payment lease from the market for an identical asset.

$$\lambda = \left[\frac{1 - E(d)}{1 + r_f} \right] e^{\sigma y}$$

The equilibrium rental lease payment for n period of lease is equal to:

$$L_{T-n} = (1 - \lambda) A_{T-n}$$

The value of option is:

$$C_{T-n} = E \left[(L_{T-n} - L) Z'_{T-n} \mid A_{T-n} > \bar{A}_{T-n} \right]$$

From the above equations, the market determined rental payment at time T- n with n fixed lease payment of L is:

$$L'_{T-n}(L) = L_{T-n} + C_{T-n+1}$$

$$L'_{T-n}(L) = (1 - \lambda) A_{T-n} + E \left[(L_{T-n+1} - L) Z'_{T-n+1} \mid A_{T-n+1} > \bar{A}_{T-n+1} \right]$$

Z'_{T-n+1} is the probability measure of the price of Arrow - Debreu primitive security. \bar{A}_{T-n+1} is the value of A_{T-n+1} when $L_{T-n+1} = L$ and $A_{T-n+1} > \bar{A}_{T-n+1}$ can be achieved if the $L_{T-n+1} > L$. The boundary condition for the above formula is when $L'_{T-n}(L) \geq L$.

The formula for n payment of standard operating leasing with the maturity time of T and the first lease payment of L^* paid when the contract is initiated (at time $t=0$), continuing to be paid periodically until time $T-1$, can be explained by:

$$L^*_o(L^*) = L^* = \sum_{i=0}^{n-1} \lambda^i (1-\lambda) A_o . Ni(h_i + \sigma\sqrt{i}; \{p\}) - L^* \sum_{i=1}^{n-1} Rf^{-i} Ni(h_i; \{p\})$$

$$h_i = \frac{\ln\left(\lambda^i \frac{A_o}{A_1}\right) + \left(\ln Rf - \frac{\sigma^2}{2}\right)^i}{\sigma\sqrt{i}}$$

The above formula is the same as the Black Scholes formula explained by Schallheim (1994). The formula for call option is adjusted to price the lease contract, because the underlying asset of leasing is a depreciating asset, but the underlying asset for call option is an appreciating stock price.

Therefore the Black Scholes formula for pricing the lease contract is:

$$C = \lambda^t . A . N(d_1) - E . e^{-rt} . N(d_2)$$

$$d_1 = \frac{\ln\left(\lambda^t \frac{A}{E}\right) + \left(r - \frac{\sigma^2}{2}\right)^t}{\sigma\sqrt{t}}$$

$$d_2 = d_1 - \sigma\sqrt{t}$$

$$\lambda = \left[\frac{1-D}{1+r}\right] e^{\sigma y}$$

D is the expected rate of economic depreciation. $\lambda^t . A$ is the substitute of stock price in a regular call option. A is the asset price. σy is the adjustment for covariance of economic depreciation with general market factors. According to Miller and Upton, if depreciation is independent from the state of the economy, the covariance is equal to zero. If the invention and pace of technology improvement improves as the economy falls, the covariance is negative. Finally, if a boom economy stimulates the progress of technology, the covariance is positive.

The model from valuing the standard operating lease is adjusted to value the lease with asset purchase requirement. This type of lease can be seen as a standard operating lease with compound option of lease payment (L) and fixed purchase option (P_T) being exercised with certainty. Since all options are exercised with certainty, the formula is reduced to:

$$L^{**} = (1 - \lambda^n) A_0 - L^{**} \sum_{i=1}^{n-1} Rf^{-i} + \lambda^n A_0 - P_T \cdot Rf^{-n}$$

$$Rf = (1 + r_f)$$

The first term is the present value of service flow generated from the asset from the time the lease contract is initiated until maturity, and it can be eliminated by the third term. Therefore, the formula becomes:

$$L^{**} = A_0 - \sum_{i=1}^{n-1} \frac{L^{**}}{(1 + r_f)^i} - \frac{P_T}{(1 + r_f)^n}$$

The net advantage for the lease can be calculated as follows:

$$NAL = A_0 - \sum_{i=0}^{n-1} \frac{\bar{L}}{(1 + r_f)^i} - \frac{P_T}{(1 + r_f)^n}$$

Therefore, the net advantage for the lease with asset purchase requirement can be calculated by knowing the asset price, the total of present value of the lease payment during the lease contract and the present value of purchase price at maturity.

3.2. Housing Finance of a Formal Mortgage

Ebrahim and Ahmed (2008) discussed the valuation of housing finance of a formal mortgage, which can be used as a basis for valuation of Ijarah sukuk, with some adjustments such as interest rate. The model can be used because the mortgage payment cash flow in a formal mortgage is similar to the cash flow of lease payment in Ijarah sukuk, although for Ijarah sukuk the asset is sold back to the asset owner at the end of contract.

The assumptions for the formal mortgage are:

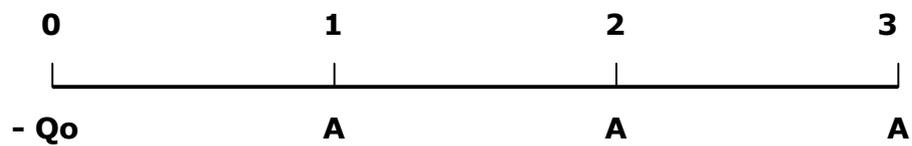
1. Borrower pays initial deposit (ID) to buy a house (Po) which is financed by lender at Qo. Therefore:

$$Q_0 = P_0 - ID$$

$$r = \frac{(1 + \gamma)}{\gamma} \tag{1}$$

r is the cost of funds and γ is the discount rate

2. Borrower makes regular payments (A) to lender from year 1 to maturity time. The payments can be explained as follows:



$$Q_0 = \sum_{i=1}^T \frac{A}{(1+r)^i}$$

$$= \sum_{i=1}^T A\gamma^i = A\gamma \sum_{i=1}^T \gamma^{(i-1)}$$

$$Q_0 = A\gamma \left(\frac{1 - \gamma^T}{1 - \gamma} \right) \tag{2}$$

The amount owed to lender at time t is:

$$\begin{aligned}
 Q_t &= Q_0(1+r)^t - \sum_{i=1}^T A(1+r)^{t-i} \\
 &= Q_0\left(\frac{1}{\gamma}\right)^t - \sum_{i=1}^T A\left(\frac{1}{\gamma}\right)^{t-i} \\
 &= \frac{Q_0}{\gamma^t} - \frac{A}{\gamma^{t-1}} \left(\frac{1-\gamma^T}{1-\gamma} \right)
 \end{aligned} \tag{3}$$

Substitute with:

$$\begin{aligned}
 Q_0 &= A\gamma \left(\frac{1-\gamma^T}{1-\gamma} \right) \\
 A &= \frac{Q_0(1-\gamma)}{\gamma(1-\gamma^T)}
 \end{aligned} \tag{4}$$

Resulting in:

$$\begin{aligned}
 Q_t &= \frac{Q_0}{\gamma^t} - \frac{Q_0(1-\gamma)}{\gamma(1-\gamma^T)} \frac{1}{\gamma^{t-1}} \left(\frac{1-\gamma^T}{1-\gamma} \right) \\
 Q_t &= Q_0 \left(\frac{1-\gamma^{T-t}}{1-\gamma^T} \right)
 \end{aligned} \tag{5}$$

3. Finally, it is assumed that the house price follows geometric Brownian motion; hence the house price changes independently from past price movement.

$$\overline{P}_t = P_0.e^{\mu t} \tag{6}$$

μ is the mean of monthly appreciation of property and σ is the standard deviation of the monthly appreciation of property.

From the above assumptions, the formal mortgage can be evaluated by considering two constraints: the asset value constraint and income constraint.

1. Asset value constraint

On the side of the lender, the outstanding loan (Q_t) is collateralized by the underlying home value at x% confidence level. The safety margin

of multiple α of standard deviation can be used to evaluate minimum initial deposit (IDmin)/ max loan (Qomax). Hence:

$$\underset{(in.t)}{Min} \frac{\log(Q_t) - \log(\overline{P_t})}{\sigma} \leq -\alpha$$

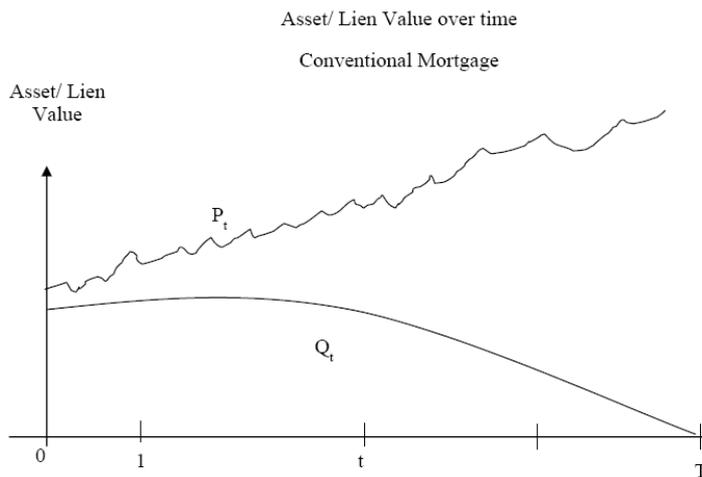
$$\underset{(in.t)}{Min} \log(Q_t) - \log(\overline{P_t}) \leq -\alpha\sigma$$

At optimum time t^* ($t^* \in (0, T)$):

$$\frac{1}{\overline{P_{t^*}}} \left(\frac{\delta \overline{P_{t^*}}}{\delta t^*} \right) \geq \frac{1}{Q_{t^*}} \left(\frac{\delta Q_{t^*}}{\delta t^*} \right)$$

$$Q_{t^*} \leq \overline{P_{t^*}} (e^{-\alpha\sigma}) \tag{7}$$

As seen below, the expected home value ($\overline{P_t}$) has an upward trend and the lien value (Q_t) has a downward trend.



When t^* is equal to 0, the previous formula can be simplified to:

$$Q_0 \leq P_0(e^{-\alpha\sigma}) \tag{8}$$

$$Q_{0_{max}} = P_0(e^{-\alpha\sigma}) \tag{9}$$

Combining with (1), we get:

$$P_0(e^{-\alpha\sigma}) \leq P_0 - ID \tag{10}$$

$$ID \geq P_0 - P_0(e^{-\alpha\sigma}) \tag{10}$$

$$ID_{min} = P_0(1 - e^{-\alpha\sigma}) \tag{11}$$

2. Income constraint

The borrower needs to have adequate income (y) to meet the mortgage commitment to pay the monthly payment to lender (A). Income of borrower (y) divided by mortgage commitment (A) is greater than or equal to income multiplier (b). Therefore, we get:

$$\frac{y}{A} \geq b \rightarrow A \leq \frac{y}{b} \rightarrow A_{\max} = \frac{y}{b} \quad (12)$$

From (2) we know that

$$Q_0 = A\gamma \left(\frac{1 - \gamma^T}{1 - \gamma} \right)$$

$$Q_{0_{\max}} = A_{\max} \gamma \left(\frac{1 - \gamma^T}{1 - \gamma} \right) \quad (13)$$

Combined with the formulae in asset value constraint (9) and income constraint (12) we get:

$$Po(e^{-\alpha\sigma}) = \frac{y}{b} \gamma \left(\frac{1 - \gamma^T}{1 - \gamma} \right)$$

$$Po(e^{-\alpha\sigma}) \cdot b(1 - \gamma) = y\gamma(1 - \gamma^T)$$

$$\gamma^T = 1 - \frac{Po(e^{-\alpha\sigma}) \cdot b(1 - \gamma)}{y\gamma}$$

$$T = \frac{\ln \left(1 - \frac{Po(e^{-\alpha\sigma}) \cdot b(1 - \gamma)}{y\gamma} \right)}{\ln(\gamma)} \quad (14)$$

When $\gamma > 0$

$$1 - \frac{Po(e^{-\alpha\sigma}) \cdot b(1 - \gamma)}{y\gamma} > 0$$

$$y\gamma - Po(e^{-\alpha\sigma}) \cdot b(1 - \gamma) > 0$$

$$b < \frac{y\gamma}{Po(e^{-\alpha\sigma}) \cdot (1 - \gamma)} \rightarrow b < \frac{y(e^{\alpha\sigma})}{Po.r} \quad (15)$$

From the above calculations, the formulae and steps to value the formal mortgage can be summarized as follows:

- a. Evaluate loan maximum (Q_0)

$$Q_{0\max} = Po(e^{-\alpha\sigma})$$

- b. Evaluate maximum of regular loan payment (A)

$$\frac{y}{A} \geq b \rightarrow A \leq \frac{y}{b} \rightarrow A_{\max} = \frac{y}{b}$$

(y = home owner income, b = income multiplier)

- c. Evaluate time to maturity (T)

$$T = \frac{\ln\left(1 - \frac{Po(e^{-\alpha\sigma}) \cdot b(1-\gamma)}{y\gamma}\right)}{\ln(\gamma)}$$

- d. Re-evaluate loan (Q_0) and initial deposit (ID)

$$Q_0 = A\gamma\left(\frac{1-\gamma^T}{1-\gamma}\right)$$

$$Q_0 = Po - ID \rightarrow ID = Po - Q_0$$

3.3. Cost of Capital and Investment in a Non-interest Economy

This model is summarized from Mirakhor (1996). The cost of capital is the cost incurred by companies to finance their physical capital. The interest rate and cost of equity finance alone cannot give an appropriate measure of the cost of capital, because the changing proportions of the company's debt and equity give effect to the risk of their yields and the market valuation. Changes in inflation rate will affect the interest rate and the company's equity. If inflation increases, the future interest payments will decrease and raise the present value of future equity. Therefore, unanticipated inflation transfers real wealth from the company's debenture holders to its equity holders. Since inflation tends to make debt seem more expensive and equity seem cheaper, in an interest-based economy the roof of the two types of capital should be combined. However, the predetermined rate of return does not exist in Islamic economies and so equity would provide a measure of the cost of capital.

The simplest model of q is formulated as follows:

$$Q = F(L, K) \quad (1)$$

Where Q is output, and $F()$ is assumed to be a concave function of L (Labour employed) and K (stock of capital). $F()$ is twice continuously differentiable with:

$$\frac{\partial F}{\partial L}, \frac{\partial F}{\partial K} > 0 \text{ and } \frac{\partial^2 F}{\partial L^2}, \frac{\partial^2 F}{\partial K^2} < 0 \quad (2)$$

A company organized on a basis of project and loss sharing will get optimum level of employment by maximizing:

$$\int_0^{\infty} (pQ - wL)e^{-\rho t} dt \quad (3)$$

(w is a wage rate, p is a price of output and ρ is a rate of return required by shareholders on equity capital). The necessary condition (with assumption that (1) is constant return to scale production function) is:

$$f(k) - f'(k)k = \frac{w}{\rho} \quad (4)$$

($k=K/L$ and $f(k)= f(K/L,1)$)

With these modifications, the expected rate of profit (r) is:

$$r = f'(k) \quad (5)$$

Moreover, with the optimum employment decision, the market value of firm (3) changes to:

$$\int_0^{\infty} prKe^{-\rho t} dt = \frac{prK}{\rho} \quad (6)$$

Tobin's q is defined as the ratio of the market value of the firm's capital stock (defined as p, r, K and ρ) to its replacement cost (defined as pK), which indicates that investment will take place if the rate of return of the shareholders is expected to be equal to the rate of profit expected from investment. Therefore, the above explanation can be written as:

$$q = \frac{r}{\rho} = \frac{V}{C} \quad (7)$$

(V is the market of the capital stock and C is its replacement cost).

When making an investment decision, the company should decide how rapidly it can add stock to the cost of capital. When doing so, it incurs adjustment cost with an increasing rate, because resources have to be moved from producing output towards installing capital goods. In order for investment to happen, the rate of profit expected (r) from investment should be higher than the rate of return (ρ) that is needed by shareholders to increase their equity share. Therefore it should meet the condition below:

$$q = \frac{r}{\rho} = \frac{V}{C} > 1 \quad (8)$$

The critical variable in a company's investment behaviour is the marginal q , or the ratio of the shadow price of capital to its replacement cost. However, the shadow price is unobservable, unlike the average q (ratio of market value of existing capital to its replacement cost), which is observable. Shadow price of capital is linked to the market valuation of existing capital. Hayashi (1982, cited in Mirakhor, 1996), has shown that under assumption of homogeneity of production function and capital adjustment cost function,

the marginal value of capital is equal to its average value, which may be observable using data on stock market valuation.

To illustrate how the above ideas can be utilized to value cost of capital without resort to rate of interest, (2) becomes:

$$V(t) = \int_0^t Y(t)e^{-\rho t} dt \quad (9)$$

($V(t)$ is the market value of stock of capital evaluated by shareholders, $Y(t)$ is the shareholders' earning stream and ρ is the rate of return expected by shareholders). Integration of (9) and rearrangement o term yields:

$$\rho = \frac{Y}{V}; Y(t) = Y \quad (10)$$

Cost of capital can be defined as:

$$C(t) = \int_0^t Ye(t)e^{-rt} dt \quad (11)$$

(Y is firm's expected earnings from capital goods; r is the expected rate of profit).

$$r = \frac{Ye}{C}; Ye(t) = Ye \quad (12)$$

If there is equality between the expectations of shareholder and entrepreneur, Y will be equal to Ye . Combine (10) and (12):

$$\begin{aligned} \rho &= \frac{Y}{V} \rightarrow Y = \rho V \\ Y &= Ye \\ r &= \frac{Ye}{C} \rightarrow r = \frac{\rho V}{C} \rightarrow \frac{r}{\rho} = \frac{V}{C} = q \end{aligned} \quad (13)$$

To find q , we have to know V and C . A simple method to calculate V is given by Gordon and Gould:

$$V = \frac{(1-b)Y}{(\rho-br)} \quad (14)$$

When investment is financed by retention and share of stock, (14) becomes:

$$V = \frac{(1-d)Y}{(\rho-dr)} \quad (15)$$

Combine (12) and (13):

$$r = \frac{Ye}{C}, Y = Ye \rightarrow C = \frac{V}{q}$$

$$q = \frac{V}{C} \rightarrow \frac{Y}{r} = \frac{V}{q}$$

$$r = \frac{qY}{V} \tag{16}$$

Combining (15) and (16), the cost of capital can be defined as:

$$V = \frac{(1-d)Y}{(\rho - dr)} \rightarrow \rho - dr = \frac{(1-d)Y}{V}$$

$$\rho = d \frac{qY}{V} + \frac{(1-d)Y}{V}$$

$$\rho = \frac{Y}{V}(dq + 1 - d) \tag{17}$$

V= the present value of a firm's stock of capital, also called the value of the firm, with assumption that there is no debt instrument present, and the company is financed by equity only.

Y= expected value of the firm's accounting earnings in the coming year.

d= b+s

b= expected value of firm's retention rate expressed as a fraction of the firm's earnings.

s= expected rate of stock financing expressed as ratio of firm's expected earnings.

r= firm's expected rate of return on investment.

If the company is already established, input can be obtained from the balance sheet. q is calculated from the ratio of V to C. Without debt, V is a market value of the firm equal to shareholders' equity valued at the year end market price of the stock. C or replacement cost is current assets, inventory, investment securities held by the firm, net property, land and equipment. Other data needed are an accounting value of the firm's expected earnings in the coming year (Y), firm's retention rate (b), and expected stock financing rate (s). b and s are expressed as a fraction of expected earnings.

4. Design of Ijarah Sukuk

From the structure of Ijarah Sukuk explained in Chapter 2, the cash flow of the Ijarah sukuk holders can be explained as follows:

Year	0	1	2	...	T
1	- Q_0				
2		+ L	+ L	+ L	+ L
3					+ P_t

At time zero, the sukuk holders give the proceeds (Q_0) of Ijarah sukuk to the issuing SPV. During the contract the sukuk holders receive periodic distribution amounts (L) from the SPV which are equal to the leasing payment received from the borrower. Finally, at the end of the contract, the SPV sell back the asset to borrower and borrower pays the repurchase price of the asset (P_t) to the SPV. The SPV distributes the dissolution distribution amount to sukuk holders. From the cash flows above, we can see that the Ijarah sukuk cash flows are similar to conventional bond cash flows. The periodic distribution amounts in Ijarah sukuk replace the coupon payments in conventional bonds, and the repurchase price or the dissolution distribution amount substitutes for the principal. El-Gamal (2006) stated that the sale and lease transaction in Ijarah sukuk is not real, and the core of the Ijarah sukuk structure is a conventional bond. In other words, Ijarah sukuk is an expensive version of the conventional bond. It is said to be an expensive version because the transaction cost in this instrument is considered significant. The Ijarah sukuk transaction costs are the fees of the SPV or the investment bank, lawyers' and Shari'ah Boards' fees, maintenance expenses and insurance expenses in the leasing transaction.

Therefore, the assumptions of an Ijarah sukuk transaction are:

1. Periodic distribution amounts

From time 1 to time T (maturity) the SPV makes regular payments or periodic distribution amounts (L) to sukuk holders which are equal to

the lease payment received by the SPV from the borrower. Present value of the lease payments or the periodic distribution amounts are:

$$PV = \frac{L}{(1+r)^1} + \frac{L}{(1+r)^2} + \frac{L}{(1+r)^3} + \dots + \frac{L}{(1+r)^T}$$

$$= \sum_{t=1}^T \frac{L}{(1+r)^t}$$

2. Repurchase price

- a. The asset follows geometric Brownian motion (gBm), the percentage in asset price is independent and identically distributed. The asset price changes independently from the movement of past price (Ebrahim and Ahmed, 2008). Therefore the monthly expected asset price at time t is:

$$P_t = P_0 \cdot e^{\mu t}$$

P_0 is the asset price at time 0. The repurchase price held at maturity is:

$$P_T = P_0 \cdot e^{\mu T}$$

- b. In some agreements, the repurchase price is predetermined, so the repurchase price is simply " P_T ", which is equal to the price agreed at the beginning of the contract transaction.

As explained in Chapter 2, there are 3 forms of repurchase transaction. However, the forms allowed by the Shari'ah Boards are:

- a. Asset repurchase with certainty:

If the asset will be repurchased with certainty at maturity, the present value of the repurchase price is:

- Geometric Brownian motion (gBm)

$$PV = \frac{P_T}{(1+r)^T}$$

$$= \frac{P_0 \cdot e^{\mu T}}{(1+r)^T}$$

- Predetermined price

$$PV = \frac{P_T}{(1+r)^T}$$

- b. Asset repurchase with call option given to the borrower:

The Black Scholes formula is used to calculate the repurchase price.

- Geometric Brownian motion (gBm)

$$\begin{aligned} C &= \lambda^T \cdot P_0 \cdot N(d_1) - P_T \cdot e^{-rT} \cdot N(d_2) \\ &= \lambda^T \cdot P_0 \cdot N(d_1) - P_0 e^{\mu T} e^{-rT} \cdot N(d_2) \\ &= \lambda^T \cdot P_0 \cdot N(d_1) - P_0 e^{\mu-r} \cdot N(d_2) \end{aligned}$$

$$d_1 = \frac{\ln\left(\lambda^T \frac{P_0}{P_0 e^{\mu T}}\right) + \left(r - \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{t}} = \frac{\ln(\lambda^T \cdot e^{-\mu T}) + \left(r - \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{t}}$$

$$d_2 = d_1 - \sigma\sqrt{t}$$

$$\lambda = \left[\frac{1-D}{1+rf}\right] e^{\alpha y}$$

- Predetermined value

$$C = \lambda^T \cdot P_0 \cdot N(d_1) - P_T \cdot e^{-rT} \cdot N(d_2)$$

$$d_1 = \frac{\ln\left(\lambda^{rT} \frac{P_0}{P_T}\right) + \left(r - \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{t}}$$

$$d_2 = d_1 - \sigma\sqrt{t}$$

$$\lambda = \left[\frac{1-D}{1+r}\right] e^{\sigma y}$$

3. Transaction cost

- a. Fee of the SPV or investment bank at the beginning of the contract (time 0)

The SPV or investment bank's fee is based on the annual asset price given by the borrower (Po).

The SPV fee is:

$$Fee = P_0 \cdot a$$

a is the proportion of the annual asset price.

- b. Fee of the Legal and Shari'ah Board at the beginning of the contract (time 0)

This is the dollar amount fee charged by the Legal and Shari'ah Board for this transaction, expressed by "S".

- c. Operating expense, such as maintenance and insurance fee from time 1 to maturity (T):

$$\begin{aligned} PV &= \frac{O_t}{(1+r)^1} + \frac{O_t}{(1+r)^2} + \frac{O_t}{(1+r)^3} + \dots + \frac{O_t}{(1+r)^T} \\ &= \sum_{t=1}^T \frac{O_t}{(1+r)^t} \end{aligned}$$

4. Discount rate

The discount rate used in this transaction cost is the cost of capital in a non-interest economy as discussed by Mirakhor (1996). Therefore, the discount rate is:

$$r = \rho = \frac{Y}{V} (1 - d + dq)$$

The price of the Ijarah sukuk is the net present value of all cash flows related to this instrument. If the repurchase transaction will be held with certainty, then from the assumptions above, the price of Ijarah sukuk is:

$$\begin{aligned}
 Q_0 &= \sum_{t=1}^T \frac{L}{(1+r)^t} + \frac{Pt}{(1+r)^T} + Po.a + S + \sum_{t=1}^T \frac{Ot}{(1+r)^t} \\
 &= \sum_{t=1}^T \frac{L + Ot}{(1+r)^t} + \frac{Pt}{(1+r)^T} + Po.a + S \\
 &= \frac{L + Ot}{r} \left[1 - \frac{1}{(1+r)^T} \right] + \frac{Pt}{(1+r)^T} + Po.a + S \\
 &= \frac{L + Ot}{r} + Po.a + S - \frac{L + Ot}{r} (1+r)^{-T} + Pt(1+r)^{-T} \\
 Q_0 &= \frac{L + Ot}{r} + Po.a + S + \left(Pt - \frac{L + Ot}{r} \right) (1+r)^{-T}
 \end{aligned}$$

However, if the asset price follows geometric Brownian motion (gBm), the repurchase price at maturity and the price of Ijarah sukuk will be changed to:

$$\begin{aligned}
 Q_0 &= \frac{L + Ot}{r} + Po.a + S + \left(Pt - \frac{L + Ot}{r} \right) (1+r)^{-T} \\
 Q_0 &= \frac{L + Ot}{r} + Po.a + S + \left(Po.e^{\mu T} - \frac{L + Ot}{r} \right) (1+r)^{-T}
 \end{aligned}$$

If the borrower has a call option, the right to buy the asset at maturity date, the price of Ijarah sukuk is:

$$Q_0 = \sum_{t=1}^T \frac{L}{(1+r)^t} + \lambda^T \cdot P_0 \cdot N(d_1) - P_T \cdot e^{-rT} \cdot N(d_2) + P_0 \cdot a + S + \sum_{t=1}^T \frac{Ot}{(1+r)^t}$$

$$Q_0 = \sum_{t=1}^T \frac{L + Ot}{(1+r)^t} + P_0(\lambda^T \cdot N(d_1) + a) - P_T \cdot e^{-rT} \cdot N(d_2) + S$$

$$d_1 = \frac{\ln\left(\lambda^T \frac{P_0}{P_T}\right) + \left(r - \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{t}}$$

$$d_2 = d_1 - \sigma\sqrt{t}$$

$$\lambda = \left[\frac{1-D}{1+r}\right] e^{\sigma y}$$

If the asset price follows geometric Brownian motion (gBm), the repurchase price at maturity and the price of Ijarah sukuk will be changed to:

$$Q_0 = \sum_{t=1}^T \frac{L}{(1+r)^t} + \lambda^T \cdot P_0 \cdot N(d_1) - P_0 \cdot e^{\mu-r} \cdot N(d_2) + P_0 \cdot a + S + \sum_{t=1}^T \frac{Ot}{(1+r)^t}$$

$$Q_0 = \sum_{t=1}^T \frac{L + Ot}{(1+r)^t} + S + P_0(\lambda^T \cdot N(d_1) - e^{\mu-r} \cdot N(d_2) + a)$$

$$d_1 = \frac{\ln\left(\lambda^T \cdot e^{-\mu T}\right) + \left(r - \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{t}}$$

$$d_2 = d_1 - \sigma\sqrt{t}$$

$$\lambda = \left[\frac{1-D}{1+r}\right] e^{\sigma y}$$

We can recap the four pricing models to price the Ijarah sukuk as follows:

1. Repurchase transaction with certainty and with predetermined price:

$$Q_0 = \frac{L + Ot}{r} + P_0.a + S + \left(P_T - \frac{L + Ot}{r} \right) (1+r)^{-T}$$

2. Repurchase transaction with certainty and the asset price follows geometric Brownian motion (gBm):

$$Q_0 = \frac{L + Ot}{r} + P_0.a + S + \left(P_0.e^{\mu T} - \frac{L + Ot}{r} \right) (1+r)^{-T}$$

3. Repurchase transaction with call option and with predetermined price:

$$Q_0 = \sum_{t=1}^T \frac{L + Ot}{(1+r)^t} + P_0 \left[\lambda^T . N(d_1) + a \right] - P_T . e^{-rT} . N(d_2) + S$$

$$d_1 = \frac{\ln \left(\lambda^T \frac{P_0}{P_T} \right) + \left(r - \frac{\sigma^2}{2} \right) T}{\sigma \sqrt{t}}; d_2 = d_1 - \sigma \sqrt{t}$$

$$\lambda = \left[\frac{1-D}{1+r} \right] e^{\sigma y}$$

4. Repurchase transaction with call option and the asset price follows geometric Brownian motion (gBm):

$$Q_0 = \sum_{t=1}^T \frac{L + Ot}{(1+r)^t} + S + P_0 \left[\lambda^T . N(d_1) - e^{\mu-r} . N(d_2) + a \right]$$

$$d_1 = \frac{\ln \left(\lambda^T . e^{-\mu T} \right) + \left(r - \frac{\sigma^2}{2} \right) T}{\sigma \sqrt{t}}; d_2 = d_1 - \sigma \sqrt{t}$$

$$\lambda = \left[\frac{1-D}{1+r} \right] e^{\sigma y}$$

For all prices, the discount rate is:

$$r = \rho = \frac{Y}{V} (1 - d + dq)$$

The explanations of the above formulae are:

Po= Price of the asset

Pt = Repurchase price

L = Lease payment

a = Percentage for SPV or investment bank fee

S = Legal and Shari'ah Board fee

Ot = Operating cost: Maintenance and insurance cost

T = Maturity time

D = Expected rate of depreciation

σ^2 = Standard deviation

σ_{ly} = Covariance term

V = Market value of firm

C = Replacement cost (current assets, inventory, investment securities held by firm, net property, land and equipment)

Y = Expected value of firm's accounting earnings

b = Expected value of firm's retention rate

s = Expected rate of stock financing

4.1. Example of Ijarah Sukuk pricing

Assume that SPV-ABC co. is a joint venture special purpose vehicle established by ABC co. On 1 January 2008, ABC co. issued a 5 year Ijarah sukuk through SPV-ABC co. to finance asset acquisition. SPV-ABC co. bought the asset from ABC co. for US\$10,000,000 and leased it back to the company. ABC co. will pay regular lease payments to SPV-ABC co., and SPV-ABC co. will distribute the exact amount of the lease payment to sukuk holders as the periodic distribution amounts. Suppose the sukuk is a par sukuk, so the lease payment: $(\text{Asset price} \times \text{cost of capital})$. At maturity ABC co. will buy back the asset for 10% of the original asset price.

For this transaction, SPV-ABC co. will charge commission at 2.5 % of the asset price. There are other expenses related to the sukuk issuance, such as the legal fee and the Shari'ah Board's fee of US\$ 200,000, and the maintenance and insurance expenses of US\$ 10,000 per year. Assume the economic rate of depreciation on the asset is 20%, the annual variance of the asset is 10%, and the covariance term is 0.

The market value of ABC co is US\$ 100,000,000, with expected value of accounting earnings of US\$ 7,000,000. The total of current assets, inventories, investment securities held by ABC co, net property, land and equipment for ABC co is US\$ 50,000,000. Assume the expected value of the company's retention rate is 35% and the expected rate of stock financing is 30%.

Therefore, the data above can be summarized as follows:

Po	\$ 10,000,000	V	\$ 100,000,000
Pt	\$ 10,000,000	C	\$ 50,000,000
L	r.Po	Y	\$ 7,000,000
a	2.5%	b	35%
S	\$ 200,000	s	30%
Ot	\$ 10,000	q	V/C=100,000,000/50,000,000
T	5		=2
D	20%	d	b+s = 35%+30%
σ^2	10%		= 65%
σ_y	0		

To calculate the cost of capital the formula illustrated by Mirakhor (1996) is used.

$$r = \rho = \frac{Y}{V} (1 - d + dq)$$

$$r = \frac{7,000,000}{100,000,000} (1 - 65\% + 65\% * 2)$$

$$= 0.07(1.65) = 0.1155 = 11.55\%$$

1. If the repurchase transaction will be held at certainty, the first formula will be use as follow:

$$Q_0 = \frac{(11.55\% * 10,000,000) + 10,000}{11.55\%} + (10,000,000 * 2.5\%) + 200,000 +$$

$$\left(10,000,000 - \frac{(11.55\% * 10,000,000) + 10,000}{11.55\%} \right) (1 + 11.55\%)^{-5}$$

$$= 10,086,580.09 + 250,000 + 200,000 +$$

$$((10,000,000 - 10,086,580.09) * 0.5789)$$

$$= 10,536,580.09 - 50,121.212$$

$$= 10,480,658.88$$

From above calculation, the price of the bond is US\$ 10,486,458.88.

2. If the repurchase transaction is held with call option for ABC co., the third formula will be used. However, in this transaction, the exercise price is equal to the original price. The asset is depreciated (except for land), so the asset price is likely to decrease in five years time. Therefore, it is unlikely for the borrower to exercise the call option to buy the asset at maturity.

$$\lambda = \left[\frac{1-D}{1+r} \right] e^{\sigma y} = \left[\frac{1-20\%}{1+11.55\%} \right] e^0 = 0.71716$$

$$d_1 = \frac{\ln \left(\lambda^T \frac{P_0}{P_T} \right) + \left(r - \frac{\sigma^2}{2} \right)^T}{\sigma \sqrt{t}}$$

$$= \frac{\ln \left(0.71716^5 \frac{10,000,000}{10,000,000} \right) + \left(11.55\% - \frac{10\%}{2} \right)^5}{\sqrt{10\%} * \sqrt{5}}$$

$$= \frac{\ln(0.1897) + (0.0655)^5}{0.7071} = \frac{-1.6623}{0.7071} = -2.3509$$

$$d_2 = d_1 - \sigma \sqrt{t} = -2.3509 - (\sqrt{10\%} * \sqrt{5}) = -3.0579$$

From the standard normal cumulative density function:

$$N(d_1) = 0.0093$$

$$N(d_2) = 0.0011$$

$$Q_0 = \sum_{t=1}^T \frac{L + Ot}{(1+r)^t} + P_0 \left[\lambda^T \cdot N(d_1) + a \right] - P_T \cdot e^{-rT} \cdot N(d_2) + S$$

$$= \frac{L + Ot}{r} \left[1 - \frac{1}{(1+r)^T} \right] + P_0 \left[\lambda^T \cdot N(d_1) + a \right] - P_T \cdot e^{-rT} \cdot N(d_2) + S$$

$$= \frac{(11.55\% * 10,000,000) + 10,000}{11.55\%} \left[1 - \frac{1}{(1+11.55\%)^5} \right] +$$

$$10,000,000 \left[(0.71716^5 * 0.4784) + 2.5\% \right] -$$

$$(10,000,000 * e^{-11.55\% * 5} * 0.2232) + 200,000$$

$$= 4,246,805.714 + 1,157,551.886 - 1,252,821.296 + 200,000$$

$$= 4,351,536.304$$

From above calculation, the price of the bond is US\$ 4,351,536.304.

CONCLUSION

Ijarah sukuk is a security that represents ownership of an equal share in the usufruct of an asset that is well defined, existing and known, tied to an Ijarah contract as defined by Shari'ah. Therefore, the transaction should follow Qur'an, Hadith and Ijtihad. Moreover, there are certain characteristics that make an Islamic contract different from a regular contract, specifically the avoidance of riba, gharar and maysir, focus on halal (rightful, legal by Islamic law) activities and the quest for justice and other ethical and religious goals. The structure of Ijarah sukuk can be with or without an SPV (special purpose vehicle) as an intermediary to issue the instrument.

There is some concern regarding the use of LIBOR to price this instrument. Although LIBOR or interest rate is often used as a benchmark to price Islamic instruments, including the Ijarah sukuk, this practice is not considered ideal, because of the close link between interest based pricing and riba. To address this issue, Mirakhor (1996) suggests that the instrument should be priced using the cost of capital in a non interest economy. In this dissertation, the formula for Ijarah sukuk pricing is constructed according to three types of model: the model for leasing as illustrated by Schallheim (1994), McConnell and Schallheim (1983) and Myers, Dill and Bautista (1976); the formal mortgage system as illustrated by Ebrahim and Ahmed (2008), and the cost of capital in a non-interest economy by Mirakhor (1996).

El-Gamal (2002) has pointed out that the Ijarah sukuk is an expensive version of a conventional bond. This is because the sale and lease transaction in this instrument is considered unreal, with many costly legal complications and side contracts for repairs and maintenance. Therefore, the pricing of Ijarah sukuk is an analogy of conventional bond price with some adjustments. The coupon payments in a conventional bond are substituted by the lease payments and the principal of the conventional bond is replaced by the repurchase price at maturity of the Ijarah sukuk. Moreover, there are additional elements such as repurchase transaction at maturity, and

transaction costs such as SPV or investment bank's fees, legal and Shari'ah boards fees, maintenance and insurance expenses.

The formula of Ijarah sukuk pricing is similar to that for the pricing of leasing with an asset purchase requirement (McConnell and Schallheim, 1983). The pricing model of this instrument is adjusted to suit the structure of Ijarah sukuk in terms of the period cash flow and the transaction costs (as discussed above). In the leasing formula of McConnell and Schallheim (1983), the lease payments begin at time 0 and continue until time $T-1$ (T is the maturity of the lease transaction). However, for the Ijarah sukuk, the cash flow of lease payment is similar to the cash flow of coupon payment in a conventional bond, which starts at time 1 and continues until maturity of the instrument.

The cash flows of the Ijarah sukuk are also similar to the cash flows of the housing finance of a formal mortgage, as discussed by Ebrahim and Ahmed (2008). There is a similarity between the regular payments of the home buyer to the lender in the formal mortgage and the lease payments in the Ijarah sukuk, because both payments start at time 1 and continue to maturity. However, there are also differences between these instruments, such as the absence of any deposit payment and the presence of the repurchase transaction and transaction costs in the Ijarah sukuk. At maturity of the Ijarah sukuk, the lessee or the borrower will buy the asset from the sukuk holders or lenders, either with certainty or with call option on the lessee.

This dissertation illustrates four types of formula based on the conditions in the contract. The first formula values the Ijarah sukuk with repurchase transaction held with certainty and with a predetermined price. The price is an analogy to the price of a conventional bond with the additional elements of Shari'ah Board's fee, legal fee and operating expenses (as explained above). It shows that this model, with slight variation, can also be used to value Ijarah sukuk with (1) repurchase transaction with certainty and the asset price follows geometric Brownian motion (gBm), (2) repurchase transaction with call option and with predetermined price, (3)

repurchase transaction with call option and the asset price follows geometric Brownian motion (gBm). The main differences among the four pricing models are related to the repurchase transaction at maturity of the instrument. If the repurchase price is predetermined in the contract, the value of the repurchase price is simply the predetermined value. However, if the asset price follows the assumption stated by Ebrahim and Ahmed (2008), that the asset price follows geometric Brownian motion (gBm), the repurchase price is calculated based on the formula of geometric Brownian motion (gBm). Moreover, as explained above, the repurchase transaction can be with certainty, or with a call option on the lessee to buy the asset from the sukuk holders at maturity. If the transaction will be done with certainty, the formula to price the repurchase transaction is simply the present value of the repurchase price. However, if the transaction is with call option, the Black Scholes formula to price a lease contract, as illustrated by Schallheim (1994), will be used to calculate the repurchase price in the Ijarah sukuk pricing model.

The implementation of the formula requires knowledge or data of price of the asset, lease payment, SPV or investment fee, Legal and Shari'ah Board fees, operating costs including maintenance and insurance cost, maturity time, and the estimate of the asset's expected rate of depreciation, standard deviation and covariance term. Moreover, to calculate the cost of capital we need data of the issuer's market value, replacement cost (current assets, inventory, investment securities held by the firm, net property, land and equipment), and the expected value of the firm's accounting earnings and retention rate and the expected rate of stock financing.

Finally, we demonstrate how this model is used to enable the issuer to set the price of the Ijarah sukuk. We evaluate the Ijarah sukuk with repurchase transaction with certainty and with predetermined price, and with repurchase transaction with call option and with predetermined price. The example helps to show the difference between the price of Ijarah sukuk with and without a call option.

There are few limitations in this dissertation. The formulae of the ijarah sukuk are sensitive to the assumptions made in to calculate the discount rate and the Black Scholes formula in the third and the fourth pricing models to value the repurchase transaction. This assumption can result to bias on the result of the ijarah sukuk pricing. The discount rate which is the cost of capital in a non interest economy is sensitive to assumptions of the expected value of firm's accounting earnings and firm's retention rate and also the expected rate of stock financing. Moreover, the Black Scholes formula is also sensitive to assumptions such as the covariance term etc.

Furthermore, this dissertation did not discuss the implication of the formulae using the real data. Therefore, for further research it is suggested to discuss the application of the formulae of the ijarah sukuk using the real data, to make sure the formulae can be used to value the ijarah sukuk in the real market and give an added value for the lessee or the borrower and for the lender or the sukuk holders. As explained above, in this dissertation three models were used as the basic to structure the formulae such as the leasing model, the formal mortgage system cost of capital in a non-interest economy. For further research it suggested that more models can be used to discuss the price of the instrument in more detail. Finally, in order to increase a full knowledge on the Islamic bond, the other types of Islamic bond can be chosen to be discussed in the further research.

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