Financial Engineering in Islamic Finance

Zamir Iqbal

EXECUTIVE SUMMARY

The objective of this article is to examine the scope of financial innovation and engineering within an Islamic financial system. The article concludes that, contrary to common belief, Islamic finance provides the basic building blocks that can be used to construct more complex instruments that will enhance liquidity and offer risk management tools. With the introduction of asset securitization and swap transactions conforming to Islamic principles, the issues of secondary markets and risk management can be addressed. The first section discusses the significance of innovation in Islamic financial markets. The second section discusses the process of introducing new products in the market and their scope. The third section illustrates an Islamic form of asset securitization as an example of financial engineering. The fourth section evaluates the structure of a commodity swap transaction to determine its validity. And finally, the fifth section concludes the discussion. © 1999 John Wiley & Sons, Inc.

Islamic financial markets have earned due recognition from international financial markets in the past decade. Continuing success...
and rapid growth is the result of increased demand for Islamic financial products by both domestic and international financial intermediaries. Islamic banking is no longer confined to the boundaries of Muslim countries but is establishing roots in non-Muslim countries as well. Furthermore, its clientele base is no longer restricted to Muslims.

Islamic financial markets are currently facing the challenge of maintaining their momentum and achieving sustainable growth. The size of the Islamic market, both in terms of its asset base and annual turnover, is still considered far below its true potential. The market suffers from a lack of depth and breadth, due to its limited set of instruments. There is an evident need for new instruments that can enhance market liquidity, develop secondary markets, and perform risk management. But the process of creating new instruments is complex and sensitive, as it requires multidisciplinary considerations including a deep understanding of Islamic jurisprudence.

**SIGNIFICANCE OF INNOVATION IN ISLAMIC FINANCIAL MARKETS**

The 1980s witnessed the rapid introduction of financial innovations in international financial markets. Financial innovations carried traditional finance and banking into sophisticated markets featuring a high degree of liquidity and a wide array of instruments that could share and transfer various sources of risk. The trend occurred in both domestic and international financial markets. Demand for liquidity enhancing and risk management instruments was prompted by increased volatility in the prices of financial assets due to the breakdown of the fixed exchange rate system, the oil shocks and excessive government spending. The innovation and growth in financial markets was further induced by advances in financial theory, breakthroughs in information processing and communication technology, and the deregulation of financial markets.²

The Bank for International Settlement (BIS) identifies three types of financial innovations which have had the most significant impact on the markets—innovations to enhance liquidity, to transfer risk (price and credit), and to generate revenues (from credit and equity).³ The marketability, negotiability, and transferability of financial

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¹ Askari and Iqbal, 1995.
² Jorion and Da Silva, 1995.
claims create liquidity by expanding the menu of options available to market participants. Derivatives make markets more complete and create important additional social benefits such as the dissemination of uniform prices upon which investment decisions can be made, and the lowering of transaction costs in the capital markets.\(^4\) In the long run, financial development and innovations usually exhibit a positive impact on a country’s economic growth.

Presently, Islamic financial markets are deficient in both liquidity and risk management tools. The basic building blocks of the Islamic financial system are geared toward the promotion of trade and partnership because Islam encourages trade, entrepreneurship, and risk sharing. Currently the market is dominated by a number of short-term traditional trade (cost-plus financing/Murabaha) and sales (mark-up or leasing/Ijara) financial transactions, whereas the proportion of medium- to long-term equity-based instruments is relatively small. Short-term trade and sales related instruments constitute approximately 85 to 90 percent of all transactions while only 10 to 15 percent are equity-related transactions. Table 1 provides the market composition as of the early 1990s of a large sample of Islamic banks.

Demand for medium-term financing is met by profit-sharing agreements (Mudarabah) and equity partnership (Musharika) instruments. Although both profit-sharing and equity participation are also used for long-term financing, these choices are limited. Even when such choices are available, investors exhibit less enthusiasm and are hesitant to commit funds and resources due to the difficulties and costs associated with liquidating assets in times of need.

The secondary markets in the Islamic financial system remain shallow, underdeveloped, and inefficient.\(^6\) The lack of efficient secondary markets and liquidity in the Islamic financial markets has indirectly limited the range of maturity structures that are available to the investor. Due to the absence of liquidity, Islamic bankers cannot easily expand their portfolios across capital markets and are restricted to limited opportunities for portfolio diversification. There is an obvious need for highly liquid instruments that would satisfy the demands of the investors desiring the flexibility of adjusting portfolios at the lowest cost and the users of funds seeking medium- and long-term maturity structures.

Risk management products are still foreign to Islamic financial markets. This is not because Islam does not recognize the need for

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\(^4\)Jorion and Da Silva, 1996: 3.
Table 1. Portfolio Distribution of Islamic Banks

<table>
<thead>
<tr>
<th>Instrument</th>
<th>1989 (%)</th>
<th>1990 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-term Murabaha</td>
<td>75.4</td>
<td>75.6</td>
</tr>
<tr>
<td>Mutajara and real estate</td>
<td>15.4</td>
<td>15.5</td>
</tr>
<tr>
<td>Medium-term investment</td>
<td>5.4</td>
<td>5.4</td>
</tr>
<tr>
<td>Equity participation</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td>Long-term Islamic investment</td>
<td>2.1</td>
<td>1.3</td>
</tr>
<tr>
<td>Social lending</td>
<td>0.3</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Source: Data compiled by International Association of Islamic Banks (IAIB).⁵

Risk management but is due to the lack of research in this area. In reality, Islam imposes greater responsibility for the prudent identification and sharing of risks. It is obvious that further growth of Islamic financial markets will largely depend on the development of secondary markets and the introduction of innovative products to enhance liquidity and risk management.

PROCESS AND SCOPE OF FINANCIAL ENGINEERING

The process of financial engineering can be viewed as either building complex instruments utilizing basic building blocks or unbundling and repackaging different components of existing financial instruments with respect to return, price risk, credit risk, country risk, etc. All of today's highly liquid instruments and derivatives are built upon a basic set of instruments. A close examination of the instruments underlying the Islamic financial system reveals that they share many of the features of today's basic building blocks, and it is the financial engineer's task to design and innovate more complex instruments without violating any of the conditions defined by the Islamic system.

The process of introducing a new product is subject to the rules defined by Islamic law (Shariah).⁷ The process of determining the le-

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⁵Fadil, 1994: p. 15. The IAIB includes most banks of the Dar-al-Mal group but not of the Al-Baraka group.

⁶Askari and Iqbal, 1995.

⁷In Islam, any activity—economic, social, political, religious—is governed by the set of Islamic laws known as Shariah. Shariah is constituted from three sources: the Quran, the Sunnah, and the Ijma. The Quran is the divine law whereas Sunnah comprises the sayings, actions, and practices of the Prophet Mohammed (peace be upon him), or his acknowledgments or implicit approval of certain actions. Ijma (collective reasoning) is the unanimity of cons-
The legitimacy of a new product involves gaining the approval of religious boards representing different schools of thought in Islamic jurisprudence. Currently, each financial institution has a special board of religious scholars to whom all new products are referred for approval. The religious board may seek the approval of the Shariah Council in countries where it exists, and this board may confer with the International Association of Islamic Bankers (IAIB) in its decisions.

From the legal point of view, any financial instrument is acceptable as legitimate provided that it does not incorporate elements considered unlawful in Islam. Islamic financial contracts or instruments must be free of Riba (a fixed and predetermined return such as the conventional interest rate), Gharar (the existence of asymmetrical information and uncertainty), Qimmar (gambling), and Ikrah (coercion). The prohibition of Riba, a term literally meaning an excess and interpreted as any unjustifiable increase of capital whether in loans or sales is the central tenet of the Islamic financial system. More precisely, any positive, fixed, predetermined interest rate that is tied to the maturity and the amount of principal (i.e., guaranteed regardless of the performance of the investment) is considered Riba and is prohibited. Gharar in a contract arises where there is a lack of knowledge or there is a reasonable doubt about the control of either party to the contract over the completion of the exchange. Qimmar refers to gambling, bets, and wagers. The essence of gambling is that of taking a risk which is not instrumental to any economic activity, for the sake of gain. Ikrah is coercion or the imposition of a contract or a condition on an unwilling party.

Freedom and the permissibility of contracts in Islam on other than a profit-sharing basis can open the door for engineering an extend-
ed menu of products. Throughout history, Islamic scholars have stipulated detailed terms for a wide range of contracts such as spot and future sales, leasing, trade and partnership. It has been generally accepted in matters of civil and economic dealings that economic agents have freedom of contract and that any agreement not specifically prohibited by the Shariah is valid, binding on parties, and enforceable by the courts. In other words, economic agents are free to enter into contracts as long as such contracts do not violate any of the rules and parameters defined by Shariah.

Historically, scholars did not set the condition that the Islamic financial system should be based solely on a profit-sharing arrangement as some contemporary scholars advocate. Contracting parties can agree on the terms of a contract and religious scholars can then rule on the permissibility of the contract by judging whether it violates Shariah rules, notably those prohibiting Riba and/or Gharar. It is critical to note that a transaction is not rendered un-Islamic if it operates in a non-profit-sharing mode such as Murabaha or Salaf, which in many ways resemble interest-based transactions but are still acceptable.

It is important to recall that while Islam prohibits pre-determined fixed returns such as interest, it in no way denies a rate of return from legitimate economic activity. The demarcation between interest and return is critical. Islam forbids a fixed or pre-determined return on financial transactions but allows for uncertain rates of return such as those represented by profits. Concepts of the time value of capital and the use of an expected rate of return or a pseudo discount rate based on the riskiness of the asset for financial valuation are by no means un-Islamic. Finally, the notion of cash flows collateralized against an underlying asset—an other essential tool of financial engineering—is quite compatible with the principles of Islam which promote investment in the real sector of the economy.

Introducing financial engineering to an Islamic financial system may not be as straightforward as it appears for several reasons. First, modern finance theory and subsequent financial innovations

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14For further detail see Mirakhor (1989) and Khan and Mirakhor (1992).
15Zamir Iqbal and Abbas Mirakhor, 'Progress and Challenges of Islamic Banking,' in the present volume.
hinge on the concept of a predetermined interest rate, which has become an integral part of all major asset-pricing models. Any attempt of financial engineering to create a new instrument without any reference to interest appears to be a challenging task. Second, in Islamic financial markets the choice of instruments is limited, whereas conventional financial markets are equipped with time-tested, well-established, and standardized financial instruments. The introduction of new products not aligned with mainstream thinking and not endorsed by major players in the field becomes difficult. Third, practitioners in conventional capital markets are well-trained professionals who have technical skills and expertise in understanding the risk/return characteristics of each basic instrument. By contrast, Islamic financial markets are lagging behind in their professional and research resources. Fourth, the conventional system is functioning within a market-based framework regulated and supervised by institutions that promote operational and allocation efficiency and reduce informational asymmetry. Countries wishing to adopt an Islamic financial system will require an institutional infrastructure with similar characteristics.

Two different approaches can be taken to financial engineering in Islamic finance—reverse engineering or innovation. The first approach, reverse engineering, entails taking an existing instrument in the conventional system and evaluating each component to find the closest substitute from the basic set of Islamic instruments. A major advantage of this approach is the gaining of instant recognition and understanding by practitioners of conventional finance, thereby paving the way for overall efficiency and the integration of Islamic financial markets into the conventional system. However, this route is subject to the real danger of contamination as a result of selecting a less-than-perfect substitute. Extreme care is required to avoid misidentifying close substitutes and circumventing rules to make a new instrument appear compatible with Shariah. This approach may be used only where an exact mapping of the characteristics of instruments in the two systems is possible.

Similar to the approaches suggested in this article, Vogel and Hayes present two approaches to financial innovation in Islamic finance; (i) implementation through replicating accepted conventional instruments, or (ii) identifying Islamic instruments that have not been fully exploited (or understood). One concern about the first approach is that mimicking conventional finance to replicate each instrument does not fit very well with the spirit of Shariah and therefore should not be the ultimate objective. For further details see Vogel and Hayes, 1998: pp. 235–291.
A second approach to financial engineering, preferable to reverse engineering, is to apply principles of Shariah to design and invent new instruments. The result will be a new array of instruments, each having a unique risk-return profile, exchanged in specialized markets. Although, this approach is more in keeping with the true spirit of the Shariah, pioneering new frontiers in a different paradigm always poses new challenges and takes time. Some of the prerequisites of an Islamic financial system, such as efficient markets, informational symmetry and Shariah compatible property rights and regulatory and supervisory laws, are absent from most of the developing Islamic countries. Also, this approach requires a deep understanding of Islamic law as well as the principles of Islamic economic and financial systems, and success will largely depend on the sincerity, dedication, and commitment of the innovators and on the availability of research resources.

Although the second approach is better in the long run, some combination of reverse engineering and innovation is more feasible in the short term. This article proposes models containing perfectly substitutable instruments together with extensions of Islamic instruments where perfect substitutes are not available. The next two sections illustrate the application of financial engineering to Islamic financial systems with cases of asset securitization and commodity swaps. Arguments are presented in favor of new instruments, but their ultimate legitimacy can only be determined and judged by Shariah scholars.

SECURITIZATION

Formally, the term securitization is often referred to as the process of enhancing marketability, negotiability, and liquidity of an otherwise dormant asset. It allows relatively illiquid securities to be transformed into risk-diversified, high return vehicles for intermediating funds. It involves packaging a pool of homogeneous assets that are normally not traded into tradable securities. Either the origi-

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19Vogel and Hayes (1998) also endorse this approach arguing for discovering functional equivalents within one's own arsenal of legal traditions rather than attempting to turn Islamic finance into conventional equivalents. They present several case studies within this framework but qualify each case study as a proposal that is subject to further scrutiny and approval by Shariah scholars.

20For further details on prerequisites of successful implementation of Islamic finance at micro- and macro-level, see Iqbal and Mirakhor in this volume.

иналь assets are used as collateral for a new tradable security that is issued (collateralized obligation) or the new tradable security is serviced by the proceeds of the original asset (pass-through security). The most prevalent forms of successful securitization in western financial markets are securities backed by mortgages, car loans, leases, and receivables from inventory, credit cards, and service centers, such as health care providers.

The securitization process involves five primary parties: the originator, the purchaser (typically an affiliated trust), the structurer or the underwriter, the guarantor, and the servicer. The originator is the original owner of the financial asset who desires to liquidify the asset by taking it off the balance sheet. The originator benefits by getting the asset off the balance sheet while other parties earn fee income for their respective roles. The structurer normally establishes a Special Purpose Vehicle (SPV) to serve as a trust. The asset side of the SPV's balance sheet reflects the securitized asset, and the liabilities side contain the certificates or notes issued against such assets. The Special Purpose Vehicle (SPV) is set up in the form of a trust or in any other form that may be suitable, considering the tax and accounting implications of the deal. The guarantor plays the role of the credit enhancer to stamp the certificates with the investment grade credit rating. Finally, the function of servicing the asset—often retained by the originator—is performed for a predetermined fee.

We can examine the mapping of the securitization process in the conventional western system to the framework of Islamic finance. Leasing (Ijara) is a well-established and recognized Islamic instrument that holds a considerable share of Islamic financial investments and offers medium- to long-term financing for capital goods and equipment required by projects. Leasing is a good candidate for Islamic asset securitization for several reasons. First, leases are by definition backed by assets, so that investors are not exposed to any credit risk. Second, they provide a collateralized and steady stream of cash flows—a desired feature for successful securitization. Third, leases can be at fixed or floating rates, hence offering more flexibility and opportunity for better assets-liabilities matching. Finally, there are similarities between Islamic leases and conventional leases that make the instrument attractive to non-Muslim investors, thereby expanding the investor base and strengthening the integration of capital markets.
Islamic financial institutions that wish to securitize their assets can start by collecting homogeneous lease contracts, i.e., auto or equipment leases with similar maturities, into a pool. Given the current size of the market, institutions probably do not individually hold sufficient numbers of assets to permit cost effective securitization, but collectively they may syndicate a substantial pool.\textsuperscript{23} A Mudaraba (Islamic form of trust financing) formed as a trust to undertake a special task can easily substitute for the Special Purpose Vehicle (SPV). Different forms of Mudaraba can be formed to optimize functionality with the applicable tax and regulatory implications. The structure of the balance sheet of the Mudaraba will be identical to the balance sheet of the SPV, i.e., a pool of leases on the assets side and certificates issued to the investors on the liabilities side.\textsuperscript{24}

The element of credit enhancement or underwriting in conventional securitization may not have an exact substitute in Islamic securitization. But finding an exact substitute is not the objective. The whole notion of credit enhancement in conventional securitization is very critical as it stamps the secured certificates with an investment grade rating. A similar function in Islamic finance can be emulated through an instrument based on the principles of Islamic Guarantee (Daman) or suretyship (Kifala) or insurance (Takaful).

Daman is a form of contract by which one person joins himself to another person, and binds himself to meet the obligations which accrue to that other person.\textsuperscript{25} Mapped into western finance, this notion is similar to cosigning, whereby a third party becomes the guarantor of a contract's performance. Similarly, Kifala implies an obligation to pay financial claims in the event of the principal debtor's inability to honor his obligation.\textsuperscript{26} An appropriate form of guarantee for securitization will be the guarantee of property whereby a person becomes guarantor for the payment at present or at a future date. In the case where several persons constitute themselves as sureties for one debtor and for one and the same debt, the creditor can only claim from each co-surety the amount for which each

\textsuperscript{23}Vogel and Hayes (1998) also propose a portfolio of pools in the form of a super-pool consisting of lease pools with similar features such as leases of the same industry or of the same maturity or of the same cash flows, e.g. fixed or floating.

\textsuperscript{24}IQBAL, 1997.

\textsuperscript{25}The Mejelle, Book III, Arab Law Quarterly, 1987, p. 158.

\textsuperscript{26}Hasanuz-Zaman, 1995.
has given a guarantee unless they have constituted themselves jointly and severally liable.\textsuperscript{27} The critical assumption is that the contract of \textit{Daman} (guarantee) which is applicable to a person can be extended to an entity with limited liability such as a corporation.

Alternatively, \textit{Takaful}, Islamic insurance, can also provide the function of credit enhancement but in a different way than \textit{Daman} (guarantee). A \textit{Takaful} fund can be established to cover future losses or the inability to perform. A fee charged as part of servicing the asset can finance this fund, and any surplus or residual after deducting costs can be distributed back to the subscribers as the maturity approaches. The remaining parts of securitization, i.e., placement, trading and servicing, can be replicated in Islamic finance without requiring any special instrument. Based on the analysis of the preceding section, it is clear that securitization of assets can be implemented in Islamic finance. Typical applications of assets securitization can be in the areas of leasing, commodities, equities and trade and export receivables.

Figure 1 illustrates the structure of lease securitization within the framework of Islamic finance.

\textsuperscript{27}Doi, 1984.
COMMODITY SWAP

The phenomenal development of the swap market is undoubtedly one of the most significant developments in international capital markets over the past decade. Incomplete markets and market inefficiencies are often put forth as arguments to explain the economic rationale for swaps. More recently, market integration across segments of financial markets, the internationalization of financial markets, the increased volatility in security prices, and an increasing demand for off-balance-sheet instruments to perform asset/liability management are cited for this rapid growth. The bulk of volume in swaps markets consists of interest rate and currency swaps with extensive variations followed by a relatively small fraction of commodity and equity swaps.

Swap deals are not practiced in Islamic financial markets mainly because the instrument is suspected to incorporate interest—a prohibited element in Islamic finance. This objection is understandable in the case of interest rate and currency swaps, but one can argue that the case of commodity swaps is different. A simple form of commodity swap could be recognized as a valid contract that does not violate any of the Shariah's rules and therefore could be considered acceptable by Shariah scholars. The acceptance of commodity swaps would be of great significance if oil producing Muslim countries of the Persian Gulf used them to hedge against unexpected and unfavorable price movements. They would not only manage their price risks but also be better equipped to forecast and plan for the future, ultimately leading to better policies and greater stability in their balance of payments.

Commodity swap is a term used to refer to a special class of financial exchange transactions in which counterparties agree to exchange cash flows related to commodity prices with the objective of managing commodity price risks. One of the basic types of commodity swap is a fixed-for-floating commodity price swap in which the end user (producer) fixes the purchase (sale) price of a commodity relative to an agreed upon market pricing benchmark for the commodity for an agreed period of time. The purpose of the swap

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is to hedge against future price risk. Commodities covered in swaps include crude oil, marine fuel, heating oil, naphtha, gasoline, natural gas, precious metals (gold, silver, and platinum), base metals (copper and aluminum), and a variety of agricultural products such as wheat. Most of these commodities are nonperishable and have published price indexes, a liquid market in the physical products, and a variety of both buyers and sellers. Also, exchange-traded futures markets already exist for many swappable commodities.\(^\text{31}\)

In order to examine the legitimacy of the commodity swap, one needs to understand the structure and the pricing mechanism of a simple fixed-for-floating price commodity swap to determine if it violates any of the Shariah's rules. In terms of the structure, like any swap, a commodity swap is nothing but a portfolio of forward contracts of different maturities. Each forward contract is a sales or purchase agreement to sell or purchase specified quantities of the commodity to be delivered in the future at a predetermined price and date. Given that the swap is a series of forward contracts, a commodity swap can be priced as portfolio of forward contracts on the commodity (utilizing forward prices).\(^\text{32}\)

The forward price of a commodity is an estimate, based on today's information and market expectations, of the future price of the underlying commodity at the time of delivery. In this capacity, forward markets serve the purpose of price discovery—the process of determining the equilibrium prices that reflect current and prospective demands for current and prospective supplies, and making these prices visible to all.\(^\text{33}\) Major factors determining the theoretical (an arbitrage-free equilibrium) forward price of a commodity are the spot price, the yield curve carry cost, and storage/holding/transportation costs.\(^\text{34}\) The yield-curve carry demonstrates that the forward price is arbitrage-free in the model. As opposed to the theoretical price, the actual future price of the commodity is greatly determined by future demand/supply, price expectations, and price/volume elasticity of the commodity.

A fix-for-floating commodity price swap can also be viewed in Islamic finance as a series of sales contracts for future delivery with

\(\text{In terms of the structure, like any swap, a commodity swap is nothing but a portfolio of forward contracts of different maturities.}\)

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varying periods. In simple words, it is a price fixing contract where
the user and producer of the commodity mutually agree to exchange
a predetermined quantity of it at a predetermined price for a specified period of time in
the future. Islamic sale contracts Bay’ Salam
or Istisna’ are the closest substitute for the de-
ferred payment sales (forward contract).35
Bay’ Salam is a sale contract in which either
advance payment is made to the seller or the
rate is fixed at the conclusion of the contract
for the deferred supply of goods.36 There is
unanimous consensus on the permissibility of Bay’ Salam, but dif-
ferences exist on the actual execution and implementation of such
contracts.

General conditions governing Bay’ Salam are that the commodity
should be delivered on a specific future date after signing the con-
tract, the amount of principal (price times quantity) paid should be
known, the principal should be paid in advance, the place of deliv-
ery should be specified, the contract should not allow options, the
principal paid should be in the form of money, and the two trans-
acted items should not be of the kind whose exchange would lead to
Riba.37 In the early days of Islam, Bay’ Salam was restricted to a
number of selected commodities. However, the subsequent jurists
unanimously treated it as a permissible mode of business and ex-
tended the list to all those commodities that could be precisely de-
termined in terms of quality and quantity.38

In spite of this acceptability, Bay’ Salam is not popular in Islamic
financial markets for two reasons. First, as opposed to the conven-
tional forward contract, Bay’ Salam requires that full payment be
made at the time of agreement.39 Delaying payment or paying in in-
stallments voids the contract. Second, since interest is incorporated
in the conventional forward pricing model, it is considered synony-
mos to paying or receiving interest and therefore prohibited by Is-
lam. One can argue that the first condition can be satisfied in dif-

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35For a detailed review of Bay’ Salam, please consult Umar, 1997.
37These conditions are according to Hanafi school of thought. For further details and compar-
39Commodity sold in a Salam contract results in debt burden on the seller and principal re-
ceived from the buyer becomes a financing vehicle for the seller. Therefore deferring the
payment of principal will lead to exchange of debt against debt, which is prohibited. See Mo-
different ways subject to acceptability by the *Shariah*. Depositing the received principal with the counter party is permissible, implying that a *Bay' Salam* seller may deposit the amount of principal he receives with the same bank with which he deals in *Salam*. Therefore, simply establishing a noninterest bearing margin account with the Bank may satisfy this requirement. One can also argue that the condition of making full payment at the time of contract can be met through a *Daman* (a guarantee) by a financial institution undertaking the responsibility of performance and payment of the principal on demand. In short, *Shariah* requires full payment at the time of contact, and fulfillment of this condition by any of previously mentioned ways is subject to *Shariah* review.

As for the objection that forward contracts incorporate *Riba*, one needs to view them from a different angle, as valid (legal) contracts of sale. First, it is a legitimate right of the producer and the user of commodity to agree on a fixed price of exchange where the price for a future delivery of the commodity can be different from the spot price. A misunderstanding arose when early Arabs rationalized and believed that interest (*Riba*-in-debt) was similar to gain in trade exchanges (*Riba*-in-barter), without realizing that the price and the profit concluded or agreed to in the original contracts of exchange, in particular the deferred contracts of exchanges, was not the same as *Riba*. Second, in an efficient market the forward price is only an unbiased predictor of the future price. Unlike other derivatives such as currency or interest rate futures, where pricing is a direct function of the interest rate, the forward price of a commodity depends on multiple factors with complex relationships. Third, if the forward contract is a sales contract executed out of a genuine need for hedging, the question of indulging in the payment or receipt of interest will not arise. The parties will undertake the forward contract to avoid price risk, and it will not be traded as a speculative financial instrument for profit making. Also, the forward discount or premium will be equivalent to the cost/mark-up of hedging. Finally, any other pricing model based on a time series or regression that does not refer to any interest rate may be used to calculate the future price.

Another form of *Salam* known as *Istisna'* also emulates a commodity swap. *Istisna'* is a contract according to which the buyer asks

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41This is based on assumption that one is allowed to combine a *Bay' Salam* contract with a guarantee. M. Akram Khan makes a similar argument in *Commodity Exchanges and Stock Exchange in an Islamic Economy*, p. 315.
42Ismail, 1992.
a manufacturer to produce something for him against a given price. There is no condition of making a full payment at the time of contract. Generally, *Istisna'* is applied to a contract of manufacturing something according to a given specification and can also be applied to natural resources like oil if some form of processing combining labor and material takes place before delivery. *Istisna'* combines two distinctive characteristics of a sales contract: (a) similar to *Bay' Salam*, the contract is permissible even though the goods have not yet materialized; (b) because it involves labor in addition to material, it becomes akin to an *‘Ijarah’* contract in which deferred payment is possible. If the full payment condition in *Bay' Salam* is not waived by the *Shariah* authorities, *Istisna* will be the more appropriate Islamic vehicle.

Figure 2 illustrates replication of three-year, semi-annual resets for 100,000 barrels of oil swap settling on 1/1/98 using Islamic instruments.

**CONCLUSION**

Financial engineering has clearly reshaped western markets in the last two decades by introducing highly sophisticated and liquid secondary markets and derivative products. Contrary to common belief, the *Shariah* also provides the basic building blocks and the flexibility of constructing innovative financial products through freedom of contract. The survival and further development of Islamic financial markets largely depend on the nature of the financial innovations introduced by market players. Long-term sustainable growth can be achieved by developing well functioning secondary markets and introducing liquidity enhancing and risk-sharing products. Securitization will help to develop secondary markets by introducing negotiable and marketable financial instruments. A well-developed secondary market and the availability of derivatives will also strengthen the integration of Islamic markets with other markets as there will be common tools for conducting financial transactions. The introduction of derivatives can have a far reaching impact on the economic growth of the GCC countries where exports are not well-diversified and are dominated by oil-

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Each $f_n$ is a \textit{(Buy' Salam or Istisna') for the nth maturity. Price for each $f_n$ can be mutually determined by the counter parties.

\textbf{Figure 2.} Replication of a Fixed-for-Floating Commodity Price Swap Agreement

Based products. In the absence of financial innovations, however, Islamic financial markets may lose their current growth momentum and may be unable to achieve their true potential.

Finally, while financial engineering may successfully devise new instruments for emerging markets, in the longer run Islamic financial markets are in need of an infrastructure which is not only compatible with the \textit{Shariah's} principles of economics and property rights but which also promotes and facilitates innovation.

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