

diffusion Of Islamic Financial Innovation: TheCase Of Islamic Investment Funds



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Abstract

A large part of the financial industry in Saudi Arabia has been transformed over the last ten to fifteen years by the spread of Islamic financial innovations. The creation and diffusion of Islamic financial innovations has converted banking from an industry that almost exclusively performed on-balance-sheet intermediation into one in which Islamic contracts and other off-balance-sheet activities are important components of the package of services provided by banks and particularly large banks.

To understand this great change in the banking industry, it is necessary to examine how these Islamic financial innovations arise and how they spread throughout the industry. There is a considerable empirical literature examining the condition under which banks adopt various off-balance-sheet activities, particularly loan sales, standby letters of credit, and loan commitments. These studies test a number of different theories about the effects of regulatory factors and market influences on off-balance-sheet activities. What are less well understood are the diffusion processes that determine the rates at which Islamic financial innovations spread across financial institutions.

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This study carries out an empirical investigation, using Mansfield's estimated model to examine the diffusion of one of the most important off-balance-sheet Islamic financial innovations (Islamic Investment Fund), and to determine the key factors that affect a bank's decision to engage in such innovation. The study will be the first of its kind (to the researchers' knowledge) which investigates the adoption of Islamic financial innovations by banks. It will contribute to the body of literature on Islamic and financial economics and will hopefully have a significant impact on future research in this area.

1 - Introduction:

Financial Industry in Saudi Arabia has experienced dramatic changes over the last two decades. A large part of this industry has been transformed over this period by the spread of Islamic Financial Innovation⁽¹⁾ (IFI). The creation and diffusion of IFIs has converted banking from an industry that almost exclusively performed on-balance-sheet intermediation into one in which Islamic contracts and other off-balance-sheet activities are important components of the package of services provided by banks and particularly large banks. To understand this great change in the banking industry, it is necessary to examine how these IFIs arise and how they spread through out the industry.

2 - Literature Review:

Much of what is now known about the adoption of financial innovation comes from the seminal contribution by Mansfield (1961). Mansfield's work has forcefully called attention both to the general overall slowness as well as to the

(1) By Islamic Financial innovation we shall mean all those financial activities that give rise to a new product according to Islamic law.

wide differentials in adoption rates among different innovations. Much of the theoretical and empirical work that has been undertaken by (Floyd (1968); Blackman (1971); Mahajan and Peterson (1978); Jeuland (1981); Lilien, Roa and Kalish (1981); Easingwood, Mahajan and Muller (1983); Mahajan, wind and Sharma (1983); Jagtiani, Saunders, and Udell (1995); and Molyneux and Shamroukh, (1996) was carried out in order to develop Mansfield's idea further and to test for these factors which can affect the rate and speed of financial innovations.

Mansfield utilized the logistic growth curve in order to analyse the time-path of use of a new innovation from the time it has been adopted until the diffusion is completed. His analysis shows that the diffusion of any innovation follows a logistic or learning curve. The rationale for the S-shape diffusion pattern though time is that adoption of an innovation spreads slowly at the early stage because the risk of adoption is high. When the innovation proves to be profitable and less costly relative to firm's assets, diffusion accelerates and this usually happens at the intermediate stage. Eventually, the pace of adoption declines as most potential adopters acquire the knowledge and the technology needed to adopt that innovation (Al-Sahlawi, 1997).

The Mansfield's logistic innovation model takes the form of Eq (1), where m_t is the cumulative number of firms that have already adopted the innovation at time t , n is the total number of firms in the industry, and B is the coefficient of internal influence.

$$(m_{(t+1)} - m_{(t)}) / (n - m_{(t)}) = \beta (m_{(t)} / n) \quad (1)$$

The model of Mansfield postulates that the number of adopters in each period is determined by the cumulative number of adopters in the previous period

in a constant way. Specifically, adoption is proportionate to the product of the number of firms that have not adopted and the proportion of the population that have already adopted the innovation at time t . Replacing discrete time by continuous time and integrating shows that diffusion will follow the logistic curve.

$$m_t / n = \{1 + \exp(-\infty - \beta_t)\}^{-1} \quad (2)$$

Where ∞ = constant of integration and t = time since the introduction of the innovation.

Mansfield proceeds to find estimates of n , ∞ and B and relates them to internal and external variables. In his original paper, n was estimated by considering the familiar transformation.

$$\text{Log} \{m_t / (n - m_t)\} = \infty + \beta_t$$

Second, Mansfield fits the equation above; using weighted least squares to generate an estimate of B .

A considerable empirical literature has been introduced to examine the condition under which banks adopt various balance-sheet activities, particularly loan sales, standby letters of credits and loan commitments. These studies test (using the above Mansfield's model) a number of different theories about the effects of regulatory factors and market influences on off-balance-sheet activities. Pavel and Phillis (1987) and Bear and Pavel (1987) suggest that banks engage in loan Securitization and standby letters of credit in order to reduce regulatory taxes, such as capital adequacy requirement. Benveniste and Berger (1986, 1987) have argued that securitization enables banks to optimize the allocation of risk sharing

by shifting risk from risk-averse to risk-neutral investors, this hypothesis predicts a positive relationship between securitization and bank risk. In contrast, Boot and Thakor (1991); Koppenhaver and Stover (1991); and Berger (1991) argued that off-balance-sheet securitization may occur in larger quantities for safer banks. The argument here is that standbys and commitments are uninsured contingent claims whose values increase with the safety of the issuing bank. This provides an incentive for banks that issue these claims to increase their safety and also offers relatively safer banks a comparative advantage in issuing these claims (Molyneux and Shamroukh, 1996).

Koppenhaver (1986) and Bear and Pavel (1988) estimated models to determine the key factors that affect a bank's decision to engage in loan commitments, standby letters of credit, commercial letters of credit, and Eurodollars. They found that the most important factors are bank quality, regulatory tax, customer demand, and changes in bank size and risk. Perhaps the most comprehensive of these studies is the one by Jurgtiani, Saunders and Udell (1995) who used the logistic model of Mansfield (1961) to examine the diffusion of five off-balance-sheet financial innovations (standby letters of credit, loan sales, swaps, options, and futures and forwards). Their results suggest that changes in capital regulations have had no consistent effect on the adoption of these off-balance-sheet activities. Moreover, they found that bank's size, capital ratios, and creditworthiness did not explain the variation in adoption patterns across banks. In a recent paper, Molyneux and Shamroukh (1996) found empirical evidence that exogenous factors (E.g., changes in regulations, demand-related factors, advances in technology) make an innovation desirable for a certain group of banks with the timing of adoption being a function of firm specific characteristics. Their results suggest that innovation adoption by one bank makes it more desirable for other banks to adopt the impact of innovation adoption by

one bank on non-adopters increases with the number of adopters.

What are less well understood are the diffusion processes that determine the rate at which Islamic Financial Innovation spreads across banks. The aim of this paper is to fill this gap by developing a general diffusion related approach to examine the adoption of IFI. The Study, in particular, carries out an empirical investigation, using Mansfield estimated model to examine the diffusion of Islamic Investment Fund ⁽²⁾ (IIFs) in Saudi Arabia, and to determine the key factors that affect a bank's decision to engage in such innovations. The study will be the first of its kind (to the researchers' knowledge) which investigates these kinds of financial innovations. It will contribute to the body of literature on Islamic and financial economics and will hopefully have a significant impact on future research in this area.

3 - Research Methodology

The model we use in this paper is an expansion of Eq (3). Eq (4) investigates the effect of some important factors on the speed of Islamic Investment Funds diffusion. The left-hand side of the equation represents the increase in the cumulative amount of money invested on these funds over time. The right hand side represents the independent variables. These variables are closely related to, and, in some instances derived from the literature discussed earlier. Eight basic variables are identified. The first, termed (T) attempts to determine the role of time on the process of diffusion of IIFs. Our hypothesis suggests that time will have a positive impact on the speed of IIFs diffusion. The rationale for this relationship is that adoption of IIFs accelerates initially as it becomes widely

(2) By Islamic Investment Funds we shall mean any such fund invested by banks or any other financial institution for individuals and organization according to Islamic law. This fund can be invested on an individual basis, with specific securities selected and held in a separate account.

known and the prospect of high profits from adoption of such investment tends to offset the risk associated with the use of a new process or manufacture of a new product.

The second independent variable included in our econometric model is Saudi banks total assets (BTA). Many researchers demonstrated that the impact of bank total assets on the rate of diffusion is statistically significant. They showed that the probability that a bank will adopt new financial innovation is an increasing function of bank's size. The theoretical justification for the inclusion of the money supply (M3), the third independent variable, comes from the belief that a higher money supply will enable Saudi investors to invest more easily. We thus expect that M3 would have a positive effect in the rate of diffusion of IIFs.

The fourth independent variable included in our model is the annual interest rate (AIR). The annual interest rate paid on deposit accounts by commercial banks is playing a very important role in directing the investment activities of any economy. So we expect that the higher the interest rate the lower the rate of financial innovation diffusion. Since we are dealing with special financial innovation (Islamic), we predict that interest rate will have no effect on the investors' decision to engage on IIFs. The growth of Saudi Share Price Index (GSPI) was included as the fifth independent variable in our model because the increase in this index might direct investors from investing in IIFs to investing directly in the stock market. Therefore, we expect a negative significant relationship between GSPI and the rate of IIFs diffusion.

The impact of bank's risk on the rate of financial innovation diffusion (measured in our study in terms of leverage ratio "LR", the sixth independent variable) has been a controversial issue. However, all agree that changes in banks' risk have an impact on the growth of financial innovations. In this study, we try to add to the literature by examining the impact of bank riskness on diffusion of

IIFs. With regard to the competitive aspects of the process of innovation diffusion, we have used our seventh independent variable (NB). Molyneux and Shamroukh found in their recent study (1996) that innovation adoption by one bank makes it more desirable for other banks to adopt the innovation and the impact of innovation adoption by one bank on non-adopters increases with the number of adopters. In this study we, therefore, argue that the number of Saudi banks that adopted IIFs (NB) should have a positive impact on other banks' adoption decision and eventually on the rate of IIFs diffusion. One of the most important factors has been used to explain the speed of financial innovation diffusion is customer demand. This factor is expected to play a role in promoting the rate of diffusion. The customer demand, the last independent variable used in this study, is measured by the growth of the amount of money invested every quarter on IIFs (GMT). We thus expect that GMT would have a positive effect in the rate of diffusion of IIFs.

$$\begin{aligned} \text{Log} (m_t / (n-m_t)) = & \beta_0 + \beta_1 (T) + \beta_2 (BTA) + \beta_3 (M_3) + \beta_4 (AIR) + \beta_5 \\ & (GSPI) + \beta_6 (LR) + \beta_7 (NB) + \beta_8 (GMT) \end{aligned} \quad (4)$$

The above equation incorporates these variables effects into the logistic model, where T is the number of quarters from the beginning of the sample (T = 1, 2, 29), B1 is an estimated speed of adoption of IIFs.

The Islamic Investment Funds industry in the Kingdom of Saudi Arabia is showing a remarkable growth in terms of the size of the funds managed as well as in the number of subscribers into these funds. All Saudi banks are now operating Islamic Investment Funds. Consequently, the total number of Islamic Investment Funds is 15 as on the end of the first quarter of the year 1998. In seven years time, the size of Islamic Funds has increased by nearly SR 4.3 billion and now stands at SR 7.14 billion.

The diffusion of financial innovation can be measured in a number of ways, such as volume, number of issues, the number of banks participating in the markets for innovations, the number of issuers of these instruments, and/ or investors in these markets (Molyneux, and Shamroukh, 1996). In this paper, we measure diffusion using the national Riyal amounts invested in Islamic Investment Funds. This paper utilizes quarterly data from the annual reports of the Saudi Arabian Monetary Agency (SAMA) during the period January 1991 to March 1998 (29 quarters).

4 - Results:

The results of the ordinary least square estimation of Eq (4) are reported in Table 1. Estimations were carried out using the Minitab and SPSS statistical packages. The overall fit of the model measured by an R2 value of 0.851 is satisfactory. However, the correlation coefficients between all possible explanatory variables, suggest that there are major problems of multicollinearity (see Table 2). For instance, the variables T, BTA, M3, and NB are highly correlated. The reason for the high multicollinearity between these four variables is that over time all of them tend to move in the same direction.

Table 1
Results of OLS Estimations

Predictor			
Constant	-3.140	-2.11*	0.049
T	0.01617	0.60	0.557
BTA	-0.00001519	-3.07*	0.006
M3	0.00002201	3.76*	0.001
AIR	0.04801	1.16	0.262
GSPI	0.001829	0.56	0.583
LR	1.143	0.16	0.871
NB	0.3977	3.73*	0.001
GMT	0.0000634	0.33	0.744

* Significant at the 1% level.

Table 2
Simple Correlation Coefficients for the Independent Variables

	Log (mt /n-mt)	T	BTA	M3	AIR	GSPI	LR	NB
T	0.562							
BTA	0.521	0.980						
M3	0.697	0.907	0.927					
AIR	0.082	0.269	0.205	0.094				
GSPI	0.270	-0.239	-0.228	-0.204	0.094			
LR	-0.017	-0.161	-0.224	-0.246	-0.318	0.026		
NB	0.765	-0.883	0.871	0.902	0.149	-0.172	-0.213	
GMT	0.631	0.614	0.586	0.612	0.279	0.314	-0.186	0.632

Experimentation with simple alternatives, such as logarithmic and semi-logarithmic functional form, did not produce any apparent improvement in the diagnostic test results. Therefore, we had to remove two independent variables (BTA and GMT) and to run the regression, not on the original variables, but on the difference (D) of successive values of the correlated variables. Our hypotheses then tested by estimation the following regression equation:

$$\text{Log } (m_t / n - m_t) = \beta_0 + \beta_1 (T) + \beta_2 (DM_3) + \beta_3 (AIR) + \beta_4 (GSPI) + \beta_5 (LR) + \beta_6 (DNB) \quad (5)$$

In order to find out whether multicollinearity or heteroscedasticity are present or likely to be present in this new estimation, the correlation matrix for all explanatory variables was calculated (see table 3). No evidence was found of a sys-

Table 3
Simple Correlation Coefficients for the Independent Variables

	Log (mt/n-mt)	T	DM3	DNB	LR	GSPI
T	0.562					
DM3	0.112	0.101				
DNB	0.251	0.153	0.257			
LR	-0.017	-0.161	-0.383	-0.353		
GSPI	0.270	-0.239	0.139	0.087	0.026	
AIR	0.082	0.269	0.057	0.321	-0.318	0.094

The results of the empirical testing of the model used are presented in Table 4 below. It is seen that the speed of adoption (B1) is positive and highly significant (as expected). This means that Islamic Investment Funds present a "Financial Innovation". The coefficient of GSPI is also significantly positive. The sign is unexpected. The result here may be attributed to the fact that many of IIFs do invest in local shares.

For DM3, DNB, LR, and AIR non-of these factors are significant. It is surprising to discover that the coefficient of AIR is insignificant in determining the speed of adoption of IIFs. The result we have is inconsistent with the popular notion that the higher the interest rates, the lower the rate of financial innovation

Table 4
Results of OLS Estimations

Predictor	Coef.	T-Ratio	P
Constant	-0.2172	-0.69	0.496
T	0.030133	3.95*	0.001
DM3	-0.00000121	-0.12	0.906
DNB	0.2030	1.20	0.244
LR	4.02	0.35	0.727
GSPI	0.008935	2.05**	0.053
AIR	-0.05704	-0.96	0.347

* Significant at the 1% level.

** Significant at the 5% level.

5 - Conclusion:

Several studies have examined why banks engage in off-balance-sheet activities. Many of these studies estimated models to determine the key factors that affect a bank's decision to engage in such activities. The main limitation of these studies

is that they all ignore how Islamic Financial Innovations diffuse through the industry. This paper presents a general model of Islamic financial innovation adoption by banks. Perhaps the single most important point to emerge from this paper is that Islamic investment funds represent a financial innovation. With regard to the factors that affect Saudi banks to engage in Islamic Investment Funds, we found that overall economic activity factors have little effect in encouraging banks to invest in Islamic financial innovation. Contrary to popular notion, our results suggest that changes in interest rate do not play a role in the speed of adoption of Islamic Investment Fund. This would allow us to address a very important conclusion that there is an Islamic factor which does seem to play that role.

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