Islamic Banks and Investment Financing

Rajesh K. Aggarwal; Tarik Yousef

Journal of Money, Credit and Banking, Vol. 32, No. 1 (Feb., 2000), 93-120.

Stable URL:
http://links.jstor.org/sici?sici=0022-2879%28200002%2932%3A1%3C93%3AIBAIF%3E2.0.CO%3B2-1

Journal of Money, Credit and Banking is currently published by Ohio State University Press.

RAJESH K. AGGARWAL
TARIK YOUSEF

Islamic Banks and Investment Financing

Islamic Law prohibits charging interest. We study financial instruments used by Islamic banks and find that most are not based on profit-and-loss sharing (equity) but, instead, are very debtlike in nature. We see some bias against providing financing for agriculture and industry. Long-term financing is rarely offered to entrepreneurs. Our model shows that debtlike instruments are a rational response by Islamic banks to their contracting environments. As agency problems become more severe, debt becomes the dominant instrument of finance. We give conditions under which banning debt increases social welfare as well as conditions under which banning debt decreases social welfare.

IN THE LAST TWO DECADES, Islamic banks have grown in size and number around the world. In this paper, we examine the types of financial contracts offered by Islamic banks. We try to understand any departures from traditional Islamic principles in the types of contracts offered. We suggest an economic rationale for the constraints imposed on Islamic banks and try to determine if these constraints are likely to be social welfare improving. We also examine the types of projects in which Islamic banks invest. In this process we hope to shed some light on the efficiency of Islamic banks and Islamic economies.

Islamic banks operate in over sixty countries, most of them in the Middle East and Asia. In three countries, Iran, Pakistan, and Sudan, the entire banking system has been converted to Islamic banking. In the other countries, the banking systems are still dominated by conventional banking institutions operating alongside Islamic banks. Even so, Islamic banking is the fastest growing segment of the credit market in Muslim countries that have Islamic banks: their market share has risen from 2 percent in the late 1970s to about 15 percent today, as measured by assets in the banking system (Babai 1995). Even conventional commercial banks have started to offer Is-

The authors thank Sheri Aggarwal, Hesna Genay, Michael Knetter, Raghu Rajan, Steve Sung, Jeff Williamson, and seminar participants at Dartmouth College, Harvard University, and the Middle Eastern Economic Association Meetings for their helpful comments. Special thanks to two anonymous referees whose comments greatly improved the exposition of the paper. The authors also thank Nazim Ali and the Harvard Islamic Finance Information Project for providing some of the data and Marcia Diefendorf for help in preparing the figures.

RAJESH K. AGGARWAL *is associate professor of economics at Dartmouth College.* TARIK YOUSEF IS *assistant professor of economics at Georgetown University.*

Journal of Money, Credit, and Banking, Vol. 32, No. 1 (February 2000)

lamic financial contracts. Unlike other commercial banks in the Middle East that were either created by or received extensive support from governments during the oil booms of the 1970s and 1980s, Islamic banks are generally the product of private initiative and have appeared predominantly in non-oil-exporting countries.

Islamic banks are supposed to offer instruments consistent with the religious beliefs and cultural characteristics of Muslim societies. According to prevailing interpretations of Islamic Law, financial instruments should emphasize profit-and-loss sharing (equity). Interest is prohibited, which seems to exclude debt contracts. This is in marked contrast with Western financial institutions. Banks in the United States, for example, primarily offer debt contracts to firms seeking capital (regulations prohibit banks from taking more than a 5 percent equity position in firms). Banks in Germany and Japan make equity investments in firms, but also use debt contracts. Non-Islamic banks operating in Muslim countries are able to offer debt contracts to firms. Even governments of Muslim countries, such as Saudi Arabia, borrow on the international capital markets. That Saudi Arabia does so is fascinating given that the Saudi monarchy derives its legitimacy from upholding Islamic Law and is a major promoter of Islamic economics. Nonetheless, Islamic Law prohibits Islamic banks from either receiving or paying interest.

We consider two issues. First, do Islamic banks operate according to the principle of profit-and-loss sharing? If not, why not? Second, is it social welfare improving to have a strict ban on debt? Who benefits and who loses from such a ban? On the first issue, our evidence indicates that most of the financing provided by Islamic banks does not conform to the principle of profit-and-loss sharing. Instead, much of the financing provided by Islamic banks takes the form of debt-like instruments.

On the second issue, proponents of Islamic banking argue that profit-sharing contracts (equity) are superior financial instruments to debt for a variety of reasons including the risk-sharing properties of equity (Ebrahim and Safadi 1995). We discuss some of these arguments in section 2. In addition, advocates of Islamic banking such as Chapra (1992) and Siddiqi (1983) have argued that Islamic banks will promote growth in Islamic countries by providing long-term financing to growth-oriented sectors of the economy.

Contrary to the expectations of Islamic banking's advocates, we find that Islamic banks rarely offer long-term financing to entrepreneurs seeking capital. In addition, the majority of Islamic banks' financial transactions at least initially were directed away from agriculture and industry and toward retail or trade financing. Further, it appears that much of the "lending" done by Islamic banks is secured, violating a legal prohibition on collateral. While this evidence does not fully answer the question about the social welfare properties of a ban on debt, it does suggest that the claimed benefits of Islamic banking may be somewhat overstated.

In order to understand why Islamic banks do not operate according to the prinicple of profit-and-loss sharing and to understand the social welfare properties of a ban on debt, we develop a model of Islamic economies and Islamic banks. Islamic banks operate mostly in developing economies where financial markets are characterized by high degrees of imperfect information and rent-seeking behavior. Data on corrup-

tion and bureaucratic inefficiency for Iran, Pakistan, and Egypt suggest that these countries have somewhat inefficient economies in which there are fairly high levels of rent seeking and corruption (Mauro 1995). Of course, corruption and inefficiency are widespread in most developing economies, not just Islamic ones. In these countries, many entrepreneurs may be willing to use funds from their firms for their own consumption of perquisites or wasteful, negative-return investments. In such cases, banks providing financing face an agency problem. In our model, the agency problem arises from contractual incompleteness, as in the models of Bolton and Scharfstein (1990) and Hart and Moore (1998). The crucial assumption is that the cash flows (profits) from the entrepreneur's project are not verifiable to a court of law. In the Bolton and Scharfstein (1990) and Hart and Moore (1998) models, this assumption rules out the use of outside profit-sharing or equity contracts as financial instruments as these are based on sharing the cash flows. In our model, by weakening an assumption on the entrepreneur's utility function, we are able to characterize when outside equity contracts will be optimal financial instruments for the bank.

We find that economies characterized by agency problems will be biased toward debt financing. As these problems become more severe, we show that debt will become the dominant instrument of finance. We also show that equity financing can be optimal and, in certain circumstances, a ban on debt can be social welfare improving. We draw connections to the literature on optimal capital structure and highlight the importance of agency problems and contractual incompleteness. We argue that the use of debtlike instruments is a rational endogenous response on the part of Islamic banks to the contracting environments in which they operate.

Several papers in the literature have examined restrictions on the use of debt. Glaeser and Scheinkman (1998) examine restrictions on usury and show that limiting the rate of interest can be social welfare improving when markets are incomplete. In their model, banning interest altogether would not be social welfare improving, as it can be in our model. In work on Islamic banking, Khan and Mirakhor (1987) and Kuran (1993) have noted that adverse selection can result in the use of debtlike instruments by Islamic banks as well.

We begin by describing the financial contracts offered by Islamic banks in section 1. In section 2, we discuss the patterns and composition of credit that have emerged in Islamic banks. We present our model in section 3. In section 4 we derive optimal contracts for the bank from the set of profit-sharing or pure equity contracts and combinations of debt and equity contracts, which nest the special case of pure debt contracts. In section 5, we compare the contracts from section 4 and examine social welfare implications. Section 6 concludes.

1. CONTRACTING IN CONTEMPORARY ISLAMIC BANKS

The Islamic legal principles that regulate the conduct and content of commercial transactions in Islamic banking date back to the early days of Islam in Arabia. The Muslim scholars of the Middle Ages made elaborate efforts to establish the funda-

mental principles of finance and commerce. These principles are supposed to govern economic activity for Muslims today. The most important of these principles is the prohibition of *riba*, any predetermined or fixed return in financial transactions. As stated in the *Quran*: "*Allah* forbids *riba* and permits trade." While there is much debate about the exact nature of this prohibition on *riba*, there exists a widespread perception that the ban on *riba* implies a ban on interest. Because this is the prevailing interpretation, we follow it in this paper.

Alternative "interest-free" financing techniques have been developed by Islamic banks and the monetary authorities of several countries. The instruments of commercial financing have been based on two principles: the profit-and-loss sharing (PLS) principle and the markup principle. The PLS principle is unanimously accepted in the Islamic legal and economic literatures as the cornerstone of financial transactions. According to the PLS principle, the bank may earn a return on invested funds provided that the bank shares in the risk of the investment and bears a loss if the project fails. Islamic banks utilize two instruments based on this principle:

- *Mudarabah* financing, where the bank provides capital and the entrepreneur contributes effort and exercises complete control over the business venture. In case of a loss, the bank earns no return or a negative return on its investment and the entrepreneur receives no compensation for her effort. In case of a gain, returns are split according to a negotiated equity percentage.
- *Musharaka* financing, where the entrepreneur and the bank jointly supply the capital and manage the project. Losses are borne in proportion to the contribution of capital while profit proportions are negotiated freely.

Both of these instruments can be thought of as equity investments, although *mudarabah* financing may be more akin to a limited partnership and *musharaka* financing is closer to a traditional equity stake with rights of control.

The markup principle has its historical roots in commercial trade activities. The bank finances the purchase of assets in exchange for a negotiated profit margin. There are two widely used instruments in this category:

- *Murabaha* financing, where the bank purchases an asset on behalf of an entrepreneur. The bank resells the asset to the entrepreneur at a predetermined price that covers the original cost and an added, negotiated profit margin. Payment is made in the future in lump sum or in installments. Ownership resides with the bank until all payments are made. *Murabaha* financing is the classic instrument for trade financing, dating to ninth-century Arabia.
- *Ijara* financing, where the bank purchases the asset and allows the entrepreneur to use it for a fixed charge. The ownership of the asset either remains with the bank or is gradually transferred to the entrepreneur in a rent-to-own contract. *Ijara* financing is the traditional contract for what is known as leasing today.

Although markup instruments are widely used, their acceptability under Islamic Law is disputed because they can imply a fixed return on investment for the bank. Many Islamic scholars have taken the position that markup techniques, while per-

missible, should still be avoided or restricted (Siddiqi 1983 and Khan 1987). Legally, the fear is that markup financing may open a "back door" to interest. Economically, observers worry that markup financing may stunt economic growth by constraining entrepreneurs from investing in new projects. In sections 4 and 5, we show that this economic argument against markup financing is flawed: markup instruments generally expand the set of projects that can be undertaken. Nevertheless, an economic case can be made against markup instruments, which we discuss in section 5.

We wish to stress that there is a formal equivalence between markup financing and debt, but the equivalence is not based on the payment of interest. Following the incomplete contracts and control rights literature (Hart and Moore 1998), we argue that the salient feature of debt is that it transfers control of an asset to the debtholder in cases of default. This has the effect of forcing the entrepreneur to disgorge cash flows by making regularly scheduled payments to prevent default. What prevents banks from contracting directly over cash flows, rather than using the indirect instrument of debt? The assumption is that cash flows may be observable by the parties but not verifiable to a court. We will discuss these assumptions in greater detail in section 3. The critical feature of markup contracts is that the bank retains ownership of the asset and can seize it in cases of default. Under PLS contracts, the bank has no such direct claim on the asset as it is in partnership with the entrepreneur. Thus it is the control rights over the asset conferred by markup financing that differentiate it from PLS financing. The control rights of markup contracts are equivalent to the control rights of debt contracts.

One of the benefits of markup contracts relative to standard Western debt contracts is that, in cases of default, there is no ambiguity about control of the assets. The bank retains title to the asset until all payments are made. In most Western countries, default triggers bankruptcy proceedings during which the entrepreneur/manager continues to control the assets (for example, Chapter 11 of U.S. bankruptcy law). Because of the delays induced by formal bankruptcy proceedings in the shift in control of the assets, bargaining problems are introduced that can significantly decrease the efficiency of investment. In principle, these problems are avoided under Islamic markup contracts.

While the rationale for banning interest is unambiguously rooted in theology, proponents of Islamic banking have also found economic arguments to support a ban on interest. Many of these arguments are similar to those put forth in medieval Christianity to restrict usury. Some of the economic rationales for the superiority of profit-and-loss sharing over the use of interest are described by the International Association of Islamic Banks (1995, pp. 3–4):

> If interest is replaced by profit sharing, some imbalances are expected to be reduced. First, the return on capital will depend on productivity. Allocation of investable funds will be guided by the soundness of the project. This will in effect improve the efficiency of capital allocation.
>
> Second, the creation of money by expanding credit will be created only when there is a strong likelihood of a corresponding increase in the supply of goods and services. In case the enterprise loses, repayment of capital to the bank is diminished by the amount of loss. Thus in the profit-sharing system, the supply of money is not allowed to overstep the supply of goods and services. This will eventually curb inflationary pressures in the economy.

> Third, the shift to profit sharing may increase the volume of investments that translates into job creation. This is because the interest mechanism makes feasible only those projects whose expected profits are sufficiently high to cover the interest rate plus added income. This filters out projects which otherwise would be accepted in the profit-sharing system.
>
> Fourth, the new system will also ensure more equitable distribution of wealth. Wealth would bring more wealth to its owners only when its use has actually resulted in the creation of additional wealth. This would in time reduce the unjust distribution of wealth which continued for decades during the interest regime.
>
> Fifth, the abolition of interest, together with the restriction of forward transaction, as prescribed by *Sharia*, will curtail speculations measurably. But still, there will be a secondary market trading common stocks and investment certificates based on profit-sharing principles. This will bring sanity back to the market and allow raising of funds for enterprises and liquidity to equity holders.

Point 1 seems to suggest that equity investors care about the quality of the projects in which they invest while lenders are indifferent to the quality of the projects to which they lend. On the other hand, point 3 seems to suggest that lenders constrain the set of projects to which they lend to the profitable ones. While these points are contradictory, point 3 does espouse the commonly held view that lenders restrict access to capital. Point 1 can also be interpreted as saying that banning debt will eliminate conflicts between equityholders and debtholders such as the asset substitution problem. We discuss this in section 5. Point 2 suggests that there is a macroeconomic benefit to a ban on interest associated with limiting the amount of liquidity in an economy and hence limiting inflationary pressures. This implies that the most important economic issue facing developing economies is inflation, rather than low growth rates. It is not obvious why restricting the supply of money will not also restrict the supply of goods and services. Further, it is likely that eliminating the credit channel of monetary policy will prove detrimental in cases of recession, so it is hard to see a clear-cut benefit associated with this point. Point 4 does not obviously hold—it is not clear why the charging of interest necessarily leads to a skewed distribution of wealth, although prohibitions on usury clearly adopt this viewpoint. Because this argument is frequently made, we discuss it in greater detail in section 5 in the context of our model. Point 5 argues that banning interest may decrease speculation, presumably because investors borrow on margin and speculate. However, the ability to borrow on margin generally leads to an increase in stock market liquidity, not a decrease as seems to be argued. Another interpretation of point 5 is that abolishing interest will decrease volatility in the market. However, the relationship between liquidity (as created by borrowing on margin) and volatility is unsettled and liquidity often decreases volatility in markets.

From this critique of interest-based banking, the proponents of Islamic banking seem to be arguing that the primary social costs of interest are that it constrains the access of entrepreneurs to capital (point 3) and that it leads to an unequal distribution of wealth (point 4). Point 3 implies that debt financing funds fewer projects than does equity financing, and there is a social welfare gain when debt is banned. We argue in section 5 that a ban on debt may, in certain circumstances, increase social welfare. However, this gain in social welfare does not come because debt constrains

the number of projects undertaken. Debt generally expands the set of projects financed, but there is a deadweight loss on each project due to the possibility of default and liquidation. In addition, there may be other costs of debt associated with adverse selection, risk shifting, or direct costs of bankruptcy (lawyers, court costs). The social welfare gain from a ban on debt comes when these costs arc sufficiently high. Point 4 implies that banning debt will allow entrepreneurs to appropriate more of the returns from their investment projects. In section 5 we show that this can be true, but we also show that banning debt is not the most efficient way to achieve this goal. We can therefore provide some economic rationales for a ban on debt, although not quite on the same grounds as proposed by the proponents of Islamic banking. We reiterate, however, that if economic efficiency and income redistribution are the key objectives of Islamic banking, then there are better means to these ends than a ban on debt.

In addition to markup and PLS financing, as part of their mission, Islamic banks are encouraged to make charitable loans to individuals or organizations that need them in the form of funds or real assets (materials, supplies, etc.). These are termed *Qard Hassan* loans, or social or benevolent loans. These loans are made at no charge, with no interest due, and with no mark-up. They are clearly negative NPV investments for Islamic banks.

2. EVIDENCE ON ISLAMIC FINANCE

The academic and policy interest in Islamic banking has been sparked in part by the seeming rapid growth of their assets and market share in the financial sectors in Muslim countries, primarily those in the Middle East. Over the last decade the assets of Islamic banks experienced an annual growth rate of 19 percent. Our calculations show that Islamic banks had approximately $100 billion in assets in 1995. Today many Islamic banks are among the five largest banks in their respective countries. We caution, however, that there is much speculation about the size of the Islamic banking market and the variance in estimates is large (*The Economist* 1996).

The advocates of Islamic banking have presented the rise of Islamic banking as the primary alternative to interest-based banking. Two problems facing the majority of Middle Eastern economies are low investment rates and weak financial intermediation structures (World Bank 1995). Islamic banks are supposed to serve the function of allocating investment funds to long-term productive projects. They are expected to favor small entrepreneurs who do not have access to credit in the conventional banking system and to extend their links to rural regions that are often cut off from formal access to urban financial markets. Islamic banks may be an engine of growth in Muslim countries. Advocates argue that PLS financing provides the vehicle for accomplishing these goals in a fair and efficient manner (Chapra 1992 and Siddiqi 1983).

We find little evidence to support these claims. First, Islamic banks rely much more heavily on markup financing than on PLS financing. Second, most financing does not appear to be long term in nature. Third, the evidence on whether or not Is-

lamic banks provide financing to capital-intensive sectors of the economy such as industry is mixed at best.

The data available on Islamic banks are somewhat limited. In this study, we use the most comprehensive data available from the International Association of Islamic Banks, as well as data from annual reports and other sources. We report what the data suggest and we caution that our conclusions are not definitive. There seems to be little reason to believe that Islamic banks operate much differently than conventional banks.

Egypt's Faisal Islamic Bank (FIBE) provides an interesting case study. FIBE was founded in 1979 and is today the fourth largest Islamic bank in the world and Egypt's sixth largest commercial bank (Kazarian 1993 and Ray 1995). Converting Kazarian's (1993) data to constant 1985 Egyptian pounds shows that the total assets of FIBE grew quite rapidly from 208 million Egyptian pounds in 1979 to 2.75 billion Egyptian pounds in 1985. Thereafter, assets declined and then leveled off in real terms to 2.05 billion Egyptian pounds in 1990. Ray (1995) shows that FIBE's market share of total deposits increased from 0.32 percent in 1979 to 7.62 percent in 1984. Market share then remained roughly constant through 1990. Because Islamic banks are excluded from competing with other banks for public-sector operations, their impact is better assessed by examining their contribution to private-sector finance. Ray (1995) finds that FIBE's market share of deposits and financings in the private sector follows the same pattern—rapid initial growth in market share to 1983 followed by a leveling off. We believe that Egypt's high rates of inflation have led to large nominal growth but little real growth for FIBE.

Several other points emerge about FIBE from Kazarian's (1993) analysis. First, FIBE has kept on average 35 percent of its assets overseas. Second, of the assets kept domestically, 46 percent on average have been kept at the Central Bank of Egypt. Taken together, 65 percent of FIBE's total assets are not used for financing of domestic projects. On both the deposits at the central bank and the assets held overseas, FIBE is earning a market rate of return on relatively safe investments. Third, when looking at the stock of assets deployed for domestic financing of investment projects, over 90 percent of the financing is markup financing. FIBE seems to maintain a policy of restricting PLS financing to 3 percent of total domestically held assets. FIBE does not appear to be growing rapidly, and it is not investing most of its assets in entrepreneurial projects. Even when FIBE does provide financing to such projects, the financing is primarily markup financing and not PLS financing.

The conclusion that the use of markup financing dominates the use of PLS financing is supported by data from other Islamic banks. In Figures 1 and 2 we plot the percentage of new financing that is markup financing and PLS financing for several large Islamic banks. For expositional ease, we have omitted the category of flows to other financing. In addition to the flow of new financing for FIBE, we also plot data for the Jordan Islamic Bank (JIB) and Bank Islam Malaysia (BIM). All three of these banks compete with conventional commercial banks in their respective countries. We also plot data for the last decade for Iran whose banking system is entirely Islamic. Except for a few years of net repayments for FIBE (which coincided with severe re-

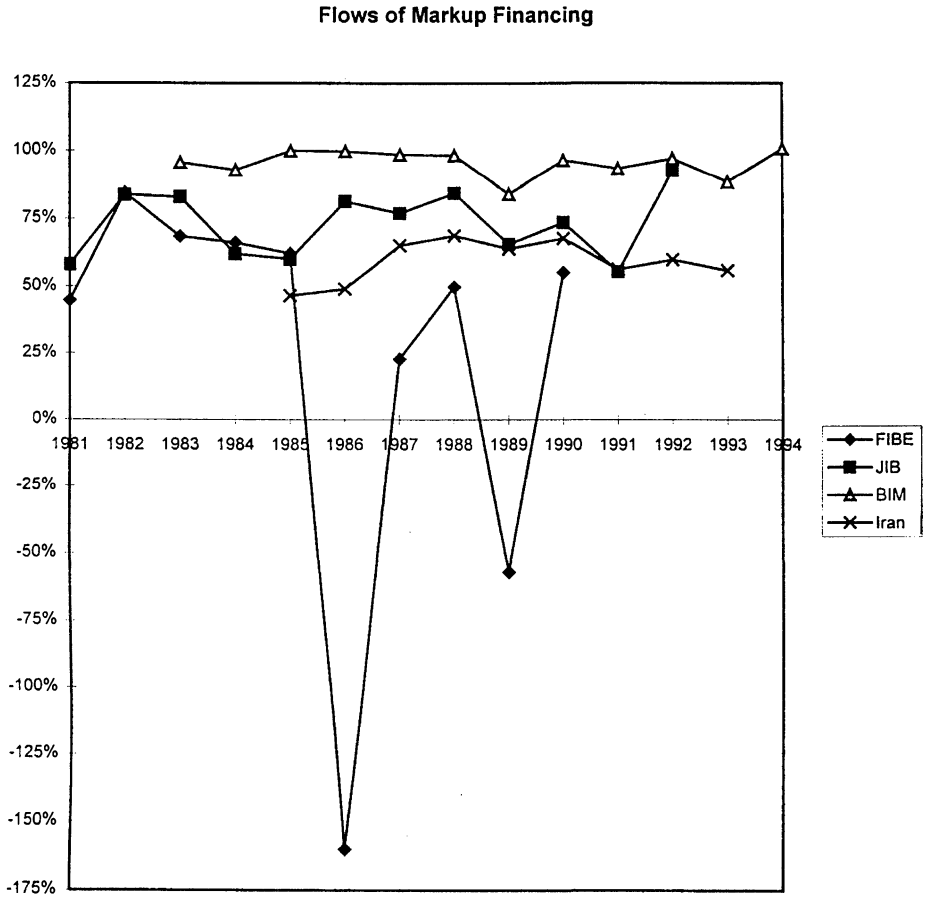

FIG. 1. Flows of Markup Financing. FIBE=Faisal Islamic Bank of Egypt, JIB=Jordan Islamic Bank, BIM=Bank Islam Malaysia, Iran=operations of the entire Iranian banking system.

Flows of financing are calculated by computing the percentage of total new financing allocated to markup financing: $(Markup(t)-Markup(t-1))/(Financing(t)-Financing(t-1))$.

The various markup instruments used were aggregated to get the percentage of markup financing.

Negative percentages indicate net repayment to FIBE: $(Financing(t)-Financing(t-1) < 0$.

Percentages greater than 100 percent (or less than -100 percent) indicate net repayment (or net financing in another category of financing, such as PLS. For example, $PLS(t)-PLS(t-1) < 0$ and $Markup(t)-Markup(t-1) > Financing(t)-Financing(t-1)$.

Sources: Authors' calculations from Ahmad (1987), Kazarian (1993), Pourian (1995), Ray (1995), Saffari (1995), Shallah (1990), Bank Negara Malaysia, Annual Reports, 1983–1994.

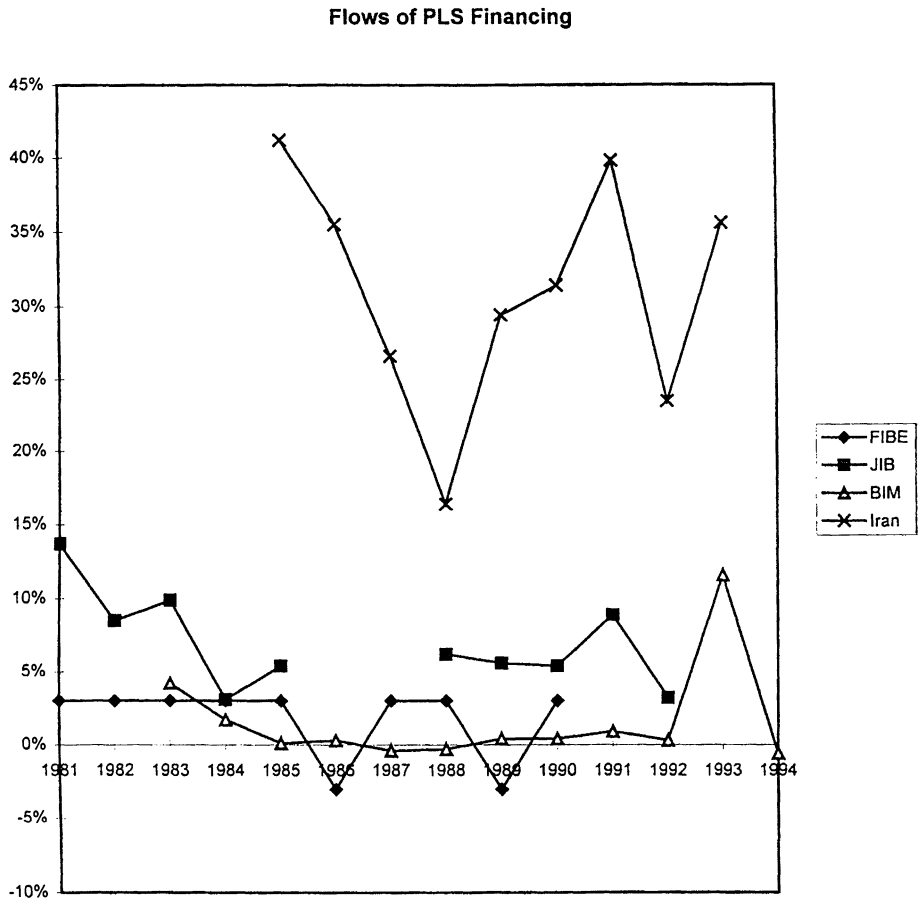

FIG. 2. Flows of PLS Financing. FIBE=Faisal Islamic Bank of Egypt, JIB=Jordan Islamic Bank. BIM=Bank Islam Malaysia, Iran=operations of the entire Iranian banking system.

Flows of financing are calculated by computing the percentage of total new financing allocated to PLS financing: $(PLS(t)-PLS(t-1))/(Financing(t)-Financing(t-1))$.

The various PLS instruments used were aggregated to get the percentage of PLS financing.

Negative percentages indicate net inflows to FIBE and BIM: $(Financing(t)-Financing(t-1) < 0$.

Data are missing for 1986 and 1987 for JIB.

Sources: Authors' calculations from Ahmad (1987), Kazarian (1993), Pourian (1995), Ray (1995), Saffari (1995), Shallah (1990), Bank Negara Malaysia, Annual Reports, 1983–1994.

cessions in Egypt), markup financing has consistently comprised more than 50 percent of flows of new financing for all of these banks. For BIM, markup financing has averaged 95.3 percent of new financing over the period 1983–1994. Except for Iran, flows of PLS financing have consistently been below 10 percent (we are missing observations for JIB in 1986 and 1987). Only in Iran is there a significant PLS component to new flows of financing. But even in Iran, the majority of financing is based on the markup principle. Kuran (1995a) and Nienhaus (1994) also report that the composition of markup techniques for other Islamic banks in mixed financial sectors is consistently above 90 percent.

Panel A of Table 1 presents more recent evidence from a large cross-section of Islamic banks in 1994 and 1995. Roughly 50 percent of the stock of financings is based on the markup principle (either *murabaha* or *ijara*). The use of markup instruments seems to be growing given the data in Figure 1. Panel A also shows that there is some skewness in the distribution of financing between large and small Islamic banks. The percentage of average dollars in *murabaha* financings is higher than the average percentage, suggesting that larger banks use *murabaha* financing more frequently than do smaller banks. This is consistent with the evidence in Figures 1 and 2. The banks in Figures 1 and 2 are some of the largest Islamic banks in the world and these banks use more markup financing than is suggested by Panel A. Table 1 presents data on a representative cross-section of Islamic banks, including many small ones. In addition, Figures 1 and 2 represent flows of new financing. Table 1 represents stocks of existing financing. We conclude that Islamic banks use PLS instruments much less frequently than markup instruments.

There is no evidence that Islamic banks are providing significant amounts of long-term capital to entrepreneurs. Metwally (1992) presents cross-sectional evidence from a survey in 1990 of twenty-two Islamic banks and investment banks operating in thirteen countries. Using his data, we calculate that, on average, 56.7 percent of financings by nominal value were for maturities lasting less than a year. Medium-term (one to two years) and long-term (two to five years) financings averaged 0.7 percent and 1.9 percent, respectively. Note that financings do not extend past five years. Western banks would consider financings of this maturity to be medium-term. Islamic banks kept, on average, 20.6 percent of their assets as deposits with other banks and/or central banks. Real estate investments were 0.66 percent of assets and *Qard Hassan* or social lending was 0.63 percent. This last point is noteworthy. Social lending does not seem to happen. Even in the Islamic Republic of Iran, where the state requires banks to allocate specific amounts of *Qard Hassan* loans, Pourian (1995, p. 92) notes a steady decline in their share of total financing from 10.5 percent in 1984 to 4.6 percent in 1993.

Kazarian (1993) presents evidence for the two Egyptian Islamic banking institutions contrasted with other Egyptian commercial banks and investment banks for 1979–1990. He finds that for FIBE, which is comparable to a commercial bank, the ratio of long-term financing to all financings is a third of that for other Egyptian commercial banks. For the Islamic Bank for International Development (IBID), an Islamic investment bank, the ratio of longterm financing to all financings is half that

TABLE 1

FINANCINGS BY ISLAMIC BANKS, 1994–95

Panel A Financings by Instrument

	1994					1995				
	Percentages		Nominal dollars (1000s)			Percentages		Nominal dollars (1000s)		
	Mean	Std Dev	Mean	Std Dev	% of mean	Mean	Std Dev	Mean	Std Dev	% of mean
Total Assets			304,809	609,013				366,802	693,021	
Murabaha	42.70%	36.04%	132,735	273,094	43.55%	45.10%	35.56%	178,088	426,136	48.55%
Ijara	9.12%	20.84%	16,614	51,281	5.45%	10.66%	22.98%	29,985	108,228	8.17%
Musharaka	11.39%	19.37%	36,939	170,790	12.12%	16.33%	26.31%	57,734	166,760	15.74%
Mudarabah	8.68%	19.64%	32,339	159,285	10.61%	6.50%	14.03%	13,637	48,956	3.72%
Other	28.10%	36.77%	86,182	245,443	28.27%	21.40%	34.04%	87,367	286,084	23.82%

Panel B Financings by Sector

	1994					1995				
	Percentages		Nominal dollars (1000s)			Percentages		Nominal dollars (1000s)		
	Mean	Std Dev	Mean	Std Dev	% of mean	Mean	Std Dev	Mean	Std Dev	% of mean
Total Assets			304,809	609,013				366,802	693,021	
Trading	29.29%	28.70%	70,476	174,534	23.12%	23.33%	26.83%	67,658	159,483	18.45%
Agriculture	11.11%	23.36%	49,159	271,111	16.13%	12.24%	23.06%	58,666	286,620	15.99%
Industry	27.85%	29.85%	74,303	138,018	24.38%	24.34%	27.93%	89,588	191,442	24.42%
Services	13.94%	21.24%	55,322	281,323	18.15%	11.77%	17.81%	28,690	73,469	7.82%
Real Estate	5.47%	13.11%	18,242	74,978	5.98%	9.45%	19.03%	42,236	160,527	11.51%
Other	12.33%	16.66%	37,306	118,029	12.24%	18.83%	21.86%	79,941	315,531	21.79%

NOTES: Number of banks = 82 for 1994. (2) Number of banks = 86 for 1995. (3) Excludes banks for which there is missing data. (4) Excludes Bank Tejarat of Iran because it is an extreme outlier and the data is suspect.
Source: Authors' calculations from International Association of Islamic Banks (1994, 1995).

of other Egyptian investment banks. This fact is connected to the dominance of markup financing as markup instruments tend to be short term in nature either by regulation (as in the case of Iran and Pakistan) or by common practice in other Islamic banks. PLS financings are typically longer in duration; their low composition is underlined by the small share of medium-term to long-term financings. In the case of Egypt, conventional banks have outperformed Islamic banks in providing long-term financing.

The evidence is mixed on whether Islamic banks invest in entrepreneurial projects in sectors that are typically viewed as growth oriented. Agriculture and industry are presumably sectors in which entrepreneurial projects would have the greatest implications for growth. Panel B of Table 1 shows that financing is balanced evenly between agriculture/industry and trade/services. Skewness of the data suggest that large banks provided more financing to agriculture and industry than to trade and services in 1995. Financing to real estate also seems to have grown in 1995, although real estate financing is still relatively small.

However, other evidence suggests that Islamic banks are not extending much financing to agriculture and industry. Kazarian (1993) finds that commercial banks in Egypt extended 37 percent of their financing to industry and agriculture in 1979–90, while FIBE allocated only 10 percent. IBID allocated 11 percent to agriculture and industry compared to 17 percent for Egypt's other investment banks. Saffari (1995) notes that the Central Bank of Iran imposed targets for financing by Iran's highly regulated Islamic banking system to various economic sectors. From 1991 to 1993, realized financings to trade and services were more than double the targeted levels while those to industry, construction, and agriculture were significantly less than the targets.

Table 2 provides summary statistics for Bank Islam Malaysia (BIM) and Jordan Islamic Bank (JIB). BIM extended on average 9.7 percent of its new financing to manufacturing for the period 1983–1994 compared to 34.1 percent for other commercial banks. However, the large standard deviations do not make this difference statistically significant. In Jordan, commercial banks allocated significantly more financing to agriculture than did JIB but JIB outperformed commercial banks in allocating funds to industry. However, Shallah (1990) claims that most of this financing to industry is import finance for equipment and supplies rather than project finance.

There is some evidence that Islamic banks require collateral for their financings, apparently violating a widely accepted legal position forbidding any form of collateral in lending transactions. Kazarian (1993) reports in his study of Egypt that FIBE and IBID secured on average 96 percent and 90 percent of their financings, respectively, compared to 60 percent for commercial banks and 78 percent for investment banks. Thus the great majority of the financing transactions by Egyptian Islamic banks are secured by some sort of financial guarantee. However, such a conclusion must be treated with caution, as ownership under markup financing resides with the bank until all payments are made. Ownership of the assets by the bank may be reported as collateralized lending, in which case the high degree of collateralization is merely an artifact of markup financing. There is other evidence that Islamic banks

TABLE 2

THE SECTORAL DISTRIBUTION OF FINANCINGS FOR BANK ISLAM MALAYSIA AND COMMERCIAL BANKS IN MALAYSIA, 1983–1994 AND JORDAN ISLAMIC BANK AND COMMERCIAL BANKS IN JORDAN, 1984–1991

	Bank Islam Malaysia		Commercial Banks	
	Mean	Std Dev	Mean	Std Dev
Manufacturing	9.69%	54.17%	34.12%	28.09%
Commerce	6.31%	15.17%	8.29%	4.91%
Housing Loans	24.08%	23.88%	24.58%	44.04%
Other	59.92%	38.11%	33.01%	67.57%
	Jordan Islamic Bank		Commercial Banks	
	Mean	Std Dev	Mean	Std Dev
Agriculture	0.47%	0.07%	2.54%	0.36%
Industry	30.36%	2.90%	14.53%	0.85%
Real Estate	16.99%	0.77%	25.05%	1.48%
Transport	7.95%	2.73%	3.41%	0.99%
Trade	24.85%	2.33%	24.93%	0.91%
Other	19.36%	2.38%	29.55%	2.69%

NOTES: (1) Data for Malaysia are in flows.
(2) Data for Jordan are stocks of financing.
(3) Other for Malaysia includes nonhousing real estate, agriculture, transport and storage, insurance and business services, and mining and quarrying.
(4) Other for Jordan includes financing to the service sector and private individuals.
(5) For JIB, a significant proportion of credit to industry consists of trade finance for the import of equipment and supplies.
Sources: Shallah (1990) and Annual Reports from Bank Negara Malaysia, Jordan Islamic Bank, and Jordan Central Bank.

are violating the prohibition on collateral. In addition to the purchased or leased goods serving as collateral, Islamic banks have been reported to require additional collateral depending on the size of the transaction. Kazarian (1993) claims that the size of this additional collateral for Egypt's Islamic banks has ranged between 40 and 85 percent of the total funds provided. This seems to suggest that much of the lending done by Islamic banks is overcollateralized.

Let us recapitulate the stylized facts that we want to explain; first, the preference by Islamic banks for debtlike instruments over equity-like instruments; second, the preference for short-term financing when using *murabahah* contracts; third, some preference for investments in the retail and trade sectors at the expense of agriculture and industry; fourth, the use of collateral when providing funds. The model we present and analyze in the next three sections explains the stylized facts but does not address why Islamic banks seem to be more averse to equity and require more collateral than conventional banks. One possible explanation is that Islamic banks suffer an adverse selection problem—they get the entrepreneurs that have been turned down by conventional banks. These entrepreneurs are worse "types"—they are more likely to divert funds and more likely to have high-cost investment projects. Conventional banks may be more attractive to all types of entrepreneurs simply because they impose fewer nonpecuniary costs such as religious restrictions on entrepreneurs.

3. THE MODEL

In this section, we present a model of investment and capital structure based on incomplete contracts. This model is in some respects similar to the models of Hart and Moore (1998) and Bolton and Scharfstein (1990). One theoretical innovation of this paper is that we allow for outside equity contracts in addition to debt contracts.

At time $t = 0$, an entrepreneur has an investment project with random uncorrelated cash flows $\hat{x}_1$ and $\hat{x}_2$ generated in periods 1 and 2. Let $\hat{x}_t \sim [0,x^H]$ with cumulative distribution function $F(x_t)$ and continuous probability density function $f(x_t)$. We make the standard monotone hazard rate assumption: the hazard rate $(1 - F(x))/f(x)$ is non-increasing in x. The risk-neutral entrepreneur has no wealth so she needs to raise I dollars to finance the project. In this simple model we assume there is no discounting. In principle, the project could be financed through any type of financial contract. For example, the project could be financed via an equity investment (profit-sharing) such as a *musharaka* or *mudarabah* contract. It could be financed through a debtlike contract (markup) such as a *murabaha* or *ijara* contract. In this context, it may not be clear what debt means given that there is no discounting. We define debt as fixed payments due in either period. These fixed payments can be interpreted as coupon payments and principal repayments. However, the crucial element of debt is not the payment of interest, but the fixed nature of the payments. Thus, we do not dwell on the explicit representation of interest in this model.

We assume the entrepreneur can divert cash flows from the project either through the consumption of perquisites or through wasteful spending. As cash flows accrue initially to the entrepreneur, she can always divert the proceeds and report lower cash flows to her investor. The investor is not fooled, but because cash flows are not verifiable the investor has no recourse. The entrepreneur generates utility from diverting cash flows but not dollar-for-dollar. The consumption of perquisites is constrained—the entrepreneur cannot consume exactly the bundle she wants. Diversion is not outright theft, but instead involves spending on negative NPV investments which benefit the entrepreneur alone (see Jensen and Meckling 1976). The entrepreneur's utility from diverting an amount y is $u(y) = cy$ where $0 \leq c \leq 1$. The entrepreneur can divert cash flows in both periods. Because cash flows are assumed to be unverifiable to a court, there is no way to force the entrepreneur to disgorge these proceeds. The entrepreneur's utility from a direct cash payment of y from the firm is $v(y) = y$. Such payments lead to unconstrained spending by the entrepreneur. Therefore the entrepreneur would prefer a direct cash payment of y from the firm to diverting an amount y from the firm's cash flows.

The cost of the investment project is $\hat{I}$, where $\hat{I}$ is distributed continuously on $[0, (Ex_1) + E(x_2)]$ with probability density function $g(I)$. The cash flows from the project are independent of the cost of the project, so the cost gives no additional information about the expected value of the project. The realized cost of the project, I, is fully observable to all at date 0. Note that the entrepreneur's project is always positive expected NPV. From a social welfare perspective, society would be better off if the

banks offered contracts to every entrepreneur as they all have positive NPV projects, even if the banks lose money.

In principle, the entrepreneur may default on a debt payment. If the entrepreneur defaults, the bank may choose to liquidate the firm's assets. If the entrepreneur defaults in the second period, the second period liquidation value of the firm is L_2. L_2 is normalized to zero because we assume that the firm ends after two periods. The liquidation value represents the future value of the investment project, which after the second period is zero. If the entrepreneur defaults in the first period, we assume that the bank can seize the project and liquidate it for L_1. No second period cash flows are then realized. We assume that $E(x_2) \geq L_1$, the liquidation value of the firm is bounded above by the expected second-period cash flow of the firm. Therefore liquidation is socially less efficient than continuation. This captures the idea that even though the entrepreneur is the most efficient user of the firm's assets, the bargaining problem between the bank and the entrepreneur may lead to liquidation in the case of default. This assumption implies that bankruptcy is costly and introduces a cost of debt financing. Our last assumption is that the banks have all of the bargaining power, or, equivalently, the banks are monopoly banks. We discuss this assumption in greater detail in section 5.

4. OPTIMAL CONTRACTS FOR THE BANK

In this section we consider general contracts that banks can offer to entrepreneurs. Such contracts can be PLS contracts (*musharaka* and *mudarabah*) or markup contracts (*murabaha* and *ijara*) in which there are specified fixed repayments or combinations of both. We characterize when PLS contracts will dominate the use of markup contracts and when they will be dominated. Markup contracts have the critical feature we ascribe to debt: default on a payment triggers a shift in control over the asset from the entrepreneur to the bank. In a markup contract this is transparent—the bank retains ownership of the asset until all of the payments are made. If a payment is not made, then the bank liquidates the asset. From now on, we refer to PLS contracts as equity and markup contracts as debt.

A general contract can consist of both debt and equity. It will be given by $\{\alpha, D_1, D_2, I\}$, where α is the amount of equity (the profit share) retained by the entrepreneur, $1-\alpha$ is the amount of equity given to the bank, D_1 is the face value of first-period debt, D_2 is the face value of second-period debt, and I is the amount of funds provided by the bank to the entrepreneur. In principal, the market value of debt may be lower than the face value of debt because the entrepreneur may default. Nothing in our analysis prevents one investor from holding debt and another investor from holding equity. Thus the contract need not be concentrated in a single bank, although that is the way we will refer to the contract. Islamic banks can offer these general contacts. These general contracts also nest the special cases of all-equity contracts, $\{\alpha, I\}$, and pure debt contracts, $\{D_1, D_2, I\}$.

The bank will maximize its expected return, $E(\pi_B)$, over the set of possible con-

tracts subject to inducing the entrepreneur to fulfill her contractual obligations (that is, not to default or divert cash flows). The bank's problem is:

$$\max_{\alpha,D_1,D_2} \int_0^{x_1'} L_1 f(x_1)dx_1 + \int_{x_1'}^{x^H} \Big(\alpha D_1 + (1-\alpha)x_1 + \int_{x_2'}^{x^H} (\alpha D_2 + (1-\alpha)x_2) f(x_2)dx_2\Big) f(x_1)dx_1 \,. \tag{1}$$

The first component of $E(\pi_B)$ is $\int_0^{x_1'} L_1 f(x_1)dx_1$. The bank liquidates the project for L_1 if the entrepreneur defaults on first-period debt, D_1. The entrepreneur will default if the realization of the first-period cash flow x_1 is less than x_1', where x_1' will be determined by the incentive compatibility and limited liability conditions given below. If $x_1 \geq x_1'$, the entrepreneur does not default and the bank receives $D_1 + (1-\alpha)(x_1-D_1) = \alpha D_1 + (1-\alpha)x_1$, the first-period debt payment and the equity share of the excess first period cash flow over the face value of debt. In addition, the bank receives its expected second-period return. If the entrepreneur defaults in the second period, the bank receives L_2. Because we have normalized $L_2 = 0$, this component drops out of the bank's expected return. The entrepreneur does not default if $x_2 \geq x_2'$, where x_2' will be determined by the conditions given below. If the entrepreneur does not default, the bank receives $D_2 + (1-\alpha)(x_2-D_2) = \alpha D_2 + (1-\alpha)x_2$, the second-period debt payment and the equity share of the excess second-period cash flow over the face value of debt.

The bank's problem is subject to incentive compatibility and limited liability conditions in both periods:

$$v(\alpha x) \geq u(x) \tag{1a}$$

$$\alpha(x_1-D_1) + \int_0^{x_2'} cx_2 f(x_2)dx_2 + \int_{x_2'}^{x^H} \alpha(x_2-D_2) f(x_2)dx_2 \geq cx_1 \tag{1b}$$

$$x_1 - D_1 \geq 0 \tag{1c}$$

$$\alpha(x_2-D_2) \geq cx_2 \tag{1d}$$

$$x_2 - D_2 \geq 0 \tag{1e}$$

Condition (1a) says that the entrepreneur's utility from paying out the cash proceeds to the equityholders must be greater than the entrepreneur's utility from diversion. Another way to write this is that $\alpha \geq c$. The entrepreneur must be given at least a fraction c of the equity, otherwise she will divert cash flows and get a higher utility. Diverting cash flows from equityholders does not constitute default and therefore cannot be prevented. Condition (1b) is the first-period incentive compatibility condition. If the entrepreneur diverts the first period cash-flow, she gets cx_1. If she makes the first-period debt payment D_1, the entrepreneur gets both her equity share, $\alpha(x_1-D_1)$, and her expected second-period return: $\int_0^{x_2'} cx_2 f(x_2)dx_2 + \int_{x_2'}^{x^H} \alpha(x_2-D_2)f(x_2)dx_2$. The face value of first-period debt and the bank's equity allocation cannot be so high

that the entrepreneur diverts all of the funds, taking into account the entrepreneur's second-period expected return. Condition (1c) is the first-period limited liability condition. This condition can also be interpreted as a zero-wealth assumption. If the first-period cash flow is not sufficiently high to meet the debt repayment, the entrepreneur cannot be held liable for the shortfall. She simply loses control of the firm to the bank. Further, the entrepreneur cannot make up the shortfall because she has no wealth with which to do so. In addition, the entrepreneur cannot borrow against the second-period return in order to make up the shortfall, that is, the entrepreneur cannot renegotiate the contract. In the analysis that follows, we show that second-period debt is not optimal for the bank, so that a bank would never be willing to allow the entrepreneur to borrow against the second-period return. Condition (1d) is the second-period incentive compatibility condition. The equity allocation to the bank and the face value of debt cannot be so high that it is optimal for the entrepreneur to divert funds conditional on the realization of the second-period cash flow. Condition (1e) is the second-period limited liability condition and its interpretation parallels that of the first-period limited liability condition.

In order to simplify the problem and derive the optimal contracts, we work backward from the second period. We first note that we can restrict attention in the second period to equity contracts because, in the second period, an equity contract dominates any type of debt contract. To see this, let $\alpha = c$ and $D_2 = 0$. Then the incentive compatibility condition (1d) is satisfied with equality for any realization of x_2 and the limited liability condition (1e) is clearly met for any realization of x_2. This contract generates second-period expected returns of $(1-c)E(x_2)$ for the bank. Now consider any alternative contract with $\alpha' \in (c, 1]$ and $D_2' > 0$. Then there exists a cutoff $x_2^* = \alpha' D_2'/(\alpha' - c)$ from condition (1d) where for $x_2 \geq x_2'$, the entrepreneur does not default and divert the cash flow. For $x_2 > x_2'$, the incentive compatibility condition is met but the entrepreneur earns excess returns (that is, this contract is ex post suboptimal for the bank). At $x_2 = x_2'$, the bank is indifferent between the $\alpha = c$ and $D_2 = 0$ and the $\alpha' \in (c, 1]$ and $D_2' > 0$ contracts. For $x_2 < x_2'$, the incentive compatibility condition is not met so the entrepreneur defaults and diverts the second-period cash flow and the bank receives nothing. As the incentive compatibility condition is met with slack for $x_2 > x_2'$, and is not met for $x_2 < x_2'$, second-period debt contracts are dominated. Further, any contract with $\alpha_2' < c$ and $D_2' \geq 0$ will violate (1a) and (1d) for any realization of x_2 and so is clearly suboptimal. Therefore, optimal second-period contracts will be $\alpha^* = c$, $D_2^* = 0$. This implies that $x_2' = 0$.

Now consider the first period. We first verify that $\alpha^* = c$ is the optimal equity portion of the contract in the first-period as well and solve for the optimal first-period debt level. Note that $D_2 = 0$ implies that the first-period incentive compatibility condition (1b) reduces to $\alpha(x_1 - D_1 + E(x_2)) \geq cx_1$. For $\alpha = c$ and $D_1 \leq E(x_2)$, condition (1b) is satisfied for all realizations of x_1. Furthermore, for $\alpha = c$ and $D_1 = E(x_2)$, condition (1b) will be met with equality for all realizations of x_1. Note, however, that the limited liability condition need not be met for all realizations of x_1. Now consider any alternative contract with $\alpha' \in (c, 1]$ and $D_1' > E(x_2)$. Then there exists a cutoff $x_1' = \alpha'(D_1' - E(x_2))/(\alpha' - c)$ from condition (1b). For $x_1 > x_1'$, condition (1b) is met

but the entrepreneur earns excess returns. At $x_1 = x_1'$, the bank is indifferent between the $\alpha = c$ and $D_1 \leq E(x_2)$ and the $\alpha' \in (c, 1]$ and $D_1' > E(x_2)$ contracts. For $E(x_2) \leq x_1 < x_1'$, condition (1b) is not met so the entrepreneur defaults and the bank receives L_1. In this region, under the $\alpha = c$ and $D_1 = E(x_2)$ contract, the bank earns

$$D_1 + (1-\alpha)(x_1 - D_1 + E(x_2)) \geq E(x_2) + (1-c)x_1 > L_1 \tag{2}$$

For $x_1 < E(x_2)$, the entrepreneur defaults under both the $D_1 = E(x_2)$ and $D_1' > E(x_2)$ contracts and the bank receives L_1. Therefore, any contract with $\alpha' \in (c, 1]$ and $D_1' > E(x_2)$ is dominated by the $\alpha = c$ and $D_1 = E(x_2)$ contract. This implies that in the first period, optimal contracts will be characterized by $\alpha^* = c$ and $D_1^* \leq E(x_2)$. Conditions (1a) and (1b) are satisfied everywhere. Therefore, the only condition that may not be satisfied is the limited liability condition (1c) which in turn implies that $x_1' = D_1$. For $x_1 < x_1'$, the entrepreneur defaults, while for $x_1 \geq x_1'$ the entrepreneur repays D_1 to the bank because the limited liability condition is satisfied.

Given the preceding analysis and $\alpha^* = c$ and $D_2^* = 0$, the bank's optimization problem reduces to

$$\max_{D_1 \in [0, E(x_2)]} \int_0^{D_1} L_1 f(x_1)dx + \int_{D_1}^{x^H} \big(D_1 + (1-c)(x_1 - D_1 + E(x_2))\big) f(x_1)dx_1 . \tag{3}$$

The monotone hazard rate ensures quasiconcavity of the bank's objective function. The first-order condition is

$$\frac{\partial E(\pi_B)}{\partial D_1} = (L_1 - D_1 - (1-c)E(x_2))f(D_1) + c(1-F(D_1)), \tag{4}$$

and the second-order condition is satisfied as well.

We first characterize when all-equity contracts will be optimal (that is $D_1 = 0$). Evaluating $\partial E(\pi_B)/\partial D_1$ at $D_1 = 0$ yields a necessary and sufficient condition for all-equity contracts to be optimal:

$$L_1 - (1-c)E(x_2) + \frac{c}{f(0)} \leq 0 . \tag{5}$$

There exists a cutoff level of moral hazard $c^* \in (0, 1)$ such that for $c \leq c^*$, pure equity contracts will be optimal and the bank will only offer pure equity contracts. When $c \leq c^*$, the rate of diversion is low. The cutoff c^* is given by

$$c^* = \frac{E(x_2) - L_1}{E(x_2) + \frac{1}{f(0)}} . \tag{6}$$

Conversely, if $c > c^*$, then $D_1^* = \bar{D}_1$ is optimal. From equation (4), $\bar{D}_1 > 0$ is given by

$$L_1 - \bar{D}_1 - (1-c)E(x_2) + \frac{c(1-F(\bar{D}_1))}{F(\bar{D}_1)} = 0 . \tag{7}$$

For $c > c^*$ (the rate of diversion is high), debt and equity contracts will be optimal relative to pure equity contracts and the bank will offer only the combination of debt and equity contracts.

Finally, in order to see when $D_1^* = E(x_2)$, we evaluate $\partial E(\pi_B)/\partial D_1$ at $D_1 = E(x_2)$ to get

$$L_1 - E(x_2) - (1-c)E(x_2) + \frac{c(1-F(E(x_2)))}{f(E(x_2))} \geq 0 . \tag{8}$$

This condition yields a cutoff for $D_1^* = E(x_2)$ to be optimal:

$$c^{**} = \frac{2E(x_2) - L_1}{E(x_2) + \frac{1-F(E(x_2))}{f(E(x_2))}} . \tag{9}$$

For $c \geq c^{**}$, the level of moral hazard is so high that a maximal first-period debt contact, $D_1^* = E(x_2)$, is optimal. There are two points to note about this cutoff. First, the cutoff for maximal debt is higher than the cutoff for any debt, $c^{**} > c^*$. This follows from the monotone hazard rate assumption. Second, it may be the case that $c^{**} > 1$. In other words, it is possible that maximal debt may not be optimal for any level of diversion.

We can write optimal first period debt contracts as

$$D_1^* = \begin{cases} 0 & \text{for } c^* \geq c \\ \bar{D}_1 & \text{for } c^{**} > c > c^* \\ E(x_2) & \text{for } c \geq c^{**} \end{cases} \tag{10}$$

assuming $c^{**} < 1$. Figure 3 depicts the optimal first-period debt contract as a function of the rate of diversion c. Using the implicit function theorem and the monotone hazard rate property yields the following comparative statics:

$$\frac{\partial D_1^*}{\partial c} \geq 0, \frac{\partial D_1^*}{\partial L_1} \geq 0, \frac{\partial D_1^*}{\partial E(x_2)} \leq 0 . \tag{11}$$

The face value of debt, D_1^*, is increasing in the rate of diversion c while the amount

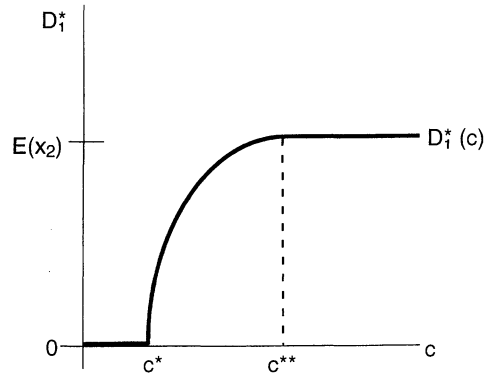

FIG. 3. Optimal First-Period Debt Contracts as a Function of the Level of Diversion

of outside equity finance $1 - \alpha^* = 1 - c$ is clearly decreasing in the rate of diversion. This is the sense in which the optimality of debt as a financial instrument depends on the level of moral hazard in an economy. The face value of debt is increasing in the liquidation value of the firm as a higher liquidation value decreases the riskiness of debt due to default. The face value of debt is decreasing in the expected value of the second period cash flow: as the second-period cash flow becomes more valuable, the cost of default increases because the second-period cash flow is not realized.

We have identified three regions of the parameter space for first-period debt contracts. However, we are primarily interested in two regions: $c \leq c^*$ so that $D_1^* = 0$, and $c > c^*$ so that $D_1^* > 0$. The first corresponds to the use of all-equity contracts. We define

$$I^E = (1-c)(E(x_1) + E(x_2)) \tag{12}$$

as the highest-cost project that can be financed under all-equity finance or profit sharing. The bank's profit share must yield (in expectation) at least the amount of funds provided by the bank. The maximum amount of equity that can be given to the bank is $1-c$, for then (1a) will bind. Because the bank has the bargaining power, when $c \leq c^*$ and for entrepreneurs with costs of investment $I \in [0, I^E)$, the optimal contract is $\alpha^* = c$, $D_1^* = 0$, and. $D_2^* = 0$. The entrepreneur's expected return is $cE(x_1) + cE(x_2)$. If $I > I^E$, then the bank's return is insufficient relative to the investment to induce the bank to provide financing using equity. Equity contracts work well when the cost of the project is low or when the rate of diversion is low. When the rate of diversion is high, the agency problem implies that the project cannot be funded with pure equity.

In the second region, the optimal debt and equity contracts are $\alpha^* = c$, $D_1^* > 0$, and $D_2^* = 0$. Entrepreneurs have an expected return of

$$\int_0^{D_1^*} cx_1 f(x_1)dx_1 + \int_{D_1^*}^{x^H} c(x_1 - D_1^* + E(x_2))f(x_1)dx_1$$
$$= cE(x_1) + c(1-F(D_1^*))(E(x_2) - D_1^*). \tag{13}$$

We define

$$I^{DE} = F(D_1^*)L_1 + (1-F(D_1^*))(cD_1^* + (1-c)E(x_2))$$
$$+ (1-c)\int_{D_1^*}^{x^H} x_1 f(x_1)dx_1 \tag{14}$$

as the highest-cost project that can be financed under the combination of debt and equity. An entrepreneur with a project that costs $I \leq I^{DE}$ will have her project funded with debt and equity. For $I > I^{DE}$, the project cannot be funded. The project is more likely to be funded the higher the liquidation value of the assets, the higher the expected value of the second-period cash flow, and the lower the rate of diversion. One additional implication follows from the optimal contracts. As the rate of diversion increases, a larger share of the project will be funded with debt and less will be funded with equity. As moral hazard increases, debt becomes the predominant instrument of finance. Note, however, that debt has costs as well as benefits. Here the cost of debt comes from the possibility of default.

5. A SOCIAL WELFARE COMPARISON OF CONTRACTS

In this section, we compare debt and equity contracts to pure equity contracts and we draw social welfare implications. For $c > c^*$, the level of moral hazard in the economy is high enough so that debt and equity contracts expand the region in which entrepreneurs can get financing relative to pure equity. The bank prefers to offer debt and equity contracts as these generate a higher return to the bank. The entrepreneurs, however, prefer pure equity because it allows them to retain more of the proceeds—conditional on the bank financing the project under either pure equity or debt and equity. Because the bank has the bargaining power, it will not offer pure equity contracts. If the level of moral hazard is low, $c \leq c^*$, then pure equity contracts will dominate the use of debt and equity. This point is of independent interest because agency models of capital structure such as Bolton and Scharfstein (1990) and Hart and Moore (1998) do not have the use of outside equity as an optimal financial instrument.

We next examine the social welfare implications of the different types of contracts. Gross social welfare per project funded under pure equity contracts is

$$GSWE = (1-c)(E(x_1) + E(x_2)) + cE(x_1) + cE(x_2) = E(x_1) + E(x_2). \tag{15}$$

Gross social welfare per project funded under debt and equity contracts is

$$GSWDE = F(D_1^*)L_1 + (1-F(D_1^*))(cD_1^* + (1-c)E(x_2)) + (1-c)\int_{D_1^*}^{x^H} x_1 f(x_1)dx_1 + cE(x_1) + c(1-F(D_1^*))(E(x_2) - D_1^*) < E(x_1) + E(x_2)\,. \tag{16}$$

However, the social welfare implications are more ambiguous than this comparison suggests because more projects may be funded under the combination of debt and equity than under pure equity. To see this, note that expected net social welfare (prior to time 0) under pure equity is

$$\int_0^{I^E} (E(x_1) + E(x_2) - I)g(I)dI\,. \tag{17}$$

Expected net social welfare (prior to time 0) under debt and equity is

$$\int_0^{I^{DE}} (F(D_1^*)L_1 + (1-F(D_1^*))E(x_2) + (1-c)\int_{D_1^*}^{x^H} x_1 f(x_1)dx_1 + cE(x_1) - I)g(I)dI\,. \tag{18}$$

In order to determine whether pure equity or risky debt and equity deliver higher social welfare [whether (17) is greater than (18)] we consider three cases. In the first case, $c \leq c^*$ (the rate of diversion is low) which means that the bank funds all investment projects with costs up to I^E with pure equity. Both entrepreneurs and banks prefer this outcome and equity contracts are optimal. In this region, a ban on debt has no force as debt contracts are not used.

Figure 4 depicts the second and third cases. In Figure 4, $c > c^*$ (the rate of diversion is high) which implies that $I^{DE} > I^E$. In this figure, debt and equity contracts fund more projects than do pure equity contracts. Banks will choose to offer only debt and equity contracts to entrepreneurs. Net social welfare is given by regions A+C. The deadweight loss of debt is given by region B, which measures the loss due to the possibility of default and liquidation from risky debt. The second case is that region C is smaller than region B. Social welfare is improved by a ban on debt. A ban on debt results in projects in the region C not being funded. However, projects with costs of investment up to I^E can still be funded with equity. Because C < B, the value of the projects foregone is less than the value lost because debt is costly, which leads to the social welfare gain by a ban on debt.

The third case is that region C is larger than region B. Not only does the combination of debt and equity fund more projects than does pure equity, but the additional increment to social welfare from more projects (C) outweighs the deadweight loss of risky debt (B). Net social welfare is A + C. In this case, a ban on debt reduces social welfare.

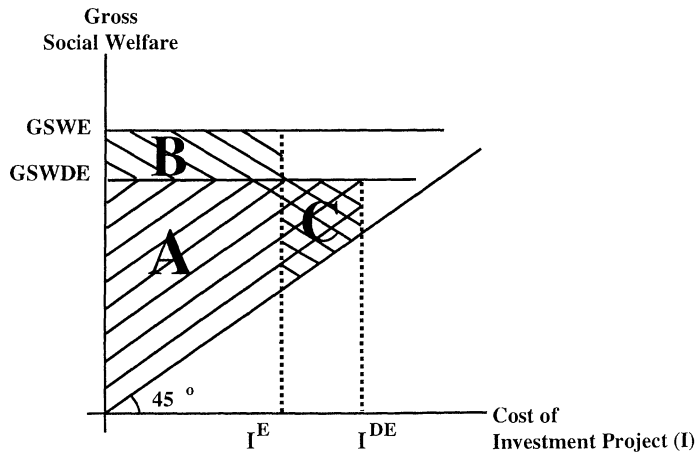

FIG. 4. A Social Welfare Comparison of Equity versus Debt and Equity

There is an economic rationale for a ban on debt. Default and liquidation are costly, and if these costs are sufficiently high, then a ban on debt can be social welfare improving. Though we have not modeled other potential costs of debt, this conclusion generalizes to other costs as well. Costs of debt associated with adverse selection, or asset substitution, or direct costs due to financial distress and bankruptcy will affect the social welfare calculation of a ban on debt in the same way that costs of liquidation did above.

While there can be an economic rationale for the ban on debt, we should also note that banning any form of economic activity generally requires some degree of enforcement. It is straightforward to see that enforcement costs will impose some deadweight losses on our social welfare calculations for a ban on debt. Clearly, Islamic banks currently evade a "ban" on debt, and historically this has been the case as well (Kuran 1993). Enforcing a ban on debt may simply be too costly for Islamic governments, even in those cases where a ban would be social welfare improving.

The results in the second and third cases depend on the assumption that banks have the bargaining power in the relationship between the bank and the entrepreneur. This assumption seems reasonable given that there are relatively few banks in most developing countries (including Muslim ones) and that most transactions are initiated by entrepreneurs competing for funds for projects. Many proponents of Islamic banking cite the "unjust distribution of wealth which continued for decades during the interest regime" (International Association of Islamic Banks (1995, pp. 3–4)) as an economic reason to ban debt. One way to interpret this critique is that banning debt is a way to shift bargaining power from banks to entrepreneurs. Conditional on being funded, entrepreneurs prefer equity contracts because they generate higher returns for the entrepreneurs. Therefore, a ban on debt can lead to a wealth redistribution. As noted above, this wealth redistribution comes at the cost of some projects not being funded.

Banning debt is not the most efficient way to achieve this wealth redistribution. If we allow for competition between banks, then banks would lose bargaining power relative to entrepreneurs. In this case, competitive banks might offer pure equity contracts to entrepreneurs. Figure 4 suggests that competitive banks would offer pure equity contracts for projects with costs of investment up to I^E and the combination of risky debt and equity contracts to projects with investment costs between I^E and I^{DE}. Low-cost projects would be financed with pure equity and high-cost projects would be financed with risky debt and equity. Another way to think about this is as a form of price discrimination in which entrepreneurs with higher-cost projects get worse financing terms than do entrepreneurs with lower-cost projects. Entrepreneurs with low-cost projects would get to keep more of the cash flows from their projects, thereby improving the distribution of wealth. Such an outcome would be unambiguously social welfare enhancing because it would reduce the number of defaults. Net social welfare would be A + B + C.

Several points emerge from this analysis. First, for $c > c^*$, debt and equity contracts expand the set of projects that can be funded relative to pure equity contracts. There is an efficiency loss because for low realizations of cash flows, entrepreneurs with debt contracts will default and firms will be liquidated, resulting in a deadweight loss to society. Nevertheless, debt and equity contracts can improve social welfare by allowing some projects to be undertaken that would otherwise not be. This result is driven by the assumption that the level of moral hazard in the economy is high. We believe this assumption is realistic when thinking about developing countries.

Second, as a corollary of the previous point, for $c > c^*$, debt and equity contracts are more profitable for banks than are pure equity contracts. Conversely, if both types of contract were offered to an entrepreneur, then the entrepreneur would prefer the pure equity contract to the debt and equity contract. Monopoly and oligopoly banks prefer to offer debt and equity contracts. In the presence of competition, we should see pure equity contracts being offered. As more banks enter Islamic countries, there may be a shift in the composition of finance toward equity.

Third, as the agency problem becomes more severe (increasing rates of diversion), the fraction of debt will rise relative to the fraction of equity in the composition of finance. This suggests that the high quantity of mark-up contracts offered by Islamic banks is a rational choice given the environment they face, one of high moral hazard. A shift toward equity can occur if the level of moral hazard in Islamic countries decreases.

Fourth, when looking at the structure of debt and equity financing, most financing will be skewed toward low-cost projects. High-cost projects (those that require more capital) are unlikely to get funded. This is consistent with some bias on the part of Islamic banks to lend to companies engaged in trade and commerce as opposed to agriculture, industry, or real estate. The latter are potentially more capital intensive than the former. Even though the assets are more intangible in the case of trade and commerce, projects are more likely to be funded given the higher potential returns.

Fifth, debt contracts will be short term in nature and equity contracts will be long

term. We view this as consistent with the fact that Islamic banks seem to lend short term primarily. Islamic banks also require a high degree of collateral for their loans. This may be because Islamic banks face a very high level of moral hazard. This may, however, simply be an artifact of the fact that the bank owns the asset in a markup contract until all of the payments are made, and so the loan is reported on the bank's balance sheet as collateralized.

6. IMPLICATIONS AND CONCLUSION

We study the set of optimal financial instruments for banks (specifically Islamic banks) operating in environments characterized by agency problems and incomplete contracts. We show that outside profit sharing or equity contracts can be optimal financial instruments even when contracts are incomplete with respect to cash flows. However, the optimality and use of equity contracts will decrease as the level of agency problems increases within an economy, and debt contracts will become the dominant form of finance.

We draw several implications from our analysis for Islamic banking. First, the observation that, for reasonable levels of moral hazard, debt and equity contracts dominate pure equity contracts from a bank's perspective accords well with the fact that Islamic banks have chosen markup contracts as their preferred mechanism of financing investment. Second, when debt and equity contracts can be used, debt will be short term in nature. Therefore, we can rationalize the preference of Islamic banks to lend short term. Third, banks will generally prefer lower-cost investment projects. This may explain the prevalence of markup contracts used to finance trade and commerce: the cost of investment projects may be lower in these sectors than in agriculture and industry or real estate. Fourth, in order to obtain financing for more costly projects, entrepreneurs will need to show that their propensity for diversion is low. The use of collateral suggests that Islamic banks seek out entrepreneurs who are unlikely to be serious moral hazard risks. Seeking additional collateral, although completely rational, contradicts the spirit of Islamic banking.

Given that Islamic banks structure their lending to be mostly short term and quite heavily secured, we conclude that Islamic banks face severe agency problems in their attempts to provide funds to entrepreneurs. Heightened competition among banks might generate more profit-sharing contracts as borrowers are able to choose among the various types of contracts on offer from the different types of banks, but we have yet to see this in the data. Furthermore, it is not clear that Islamic banks will provide more competition to conventional commercial banks in Muslim countries. Our evidence suggests that Islamic banks are niche providers of capital, and within that niche do not operate much differently from conventional banks.

These results have implications for the literature on religious norms and economics. Kuran (1983, 1995a, 1995b) argues that the principal shortcoming of Islamic economics is that it does not properly account for the impact of economic incentives. In short, religious norms are unlikely to change human behavior when fundamental

economic considerations such as wealth maximization are present. Our results suggest that economic incentives are shaping the structure of Islamic banking more so than are religious norms. The key economic restriction of Islamic Law is the ban on interest. While the religious basis for this restriction is a concern with income inequality and unequal access to capital, there is an economic case for the ban on the use of interest. The inefficiencies necessary to justify the ban on interest primarily have to do with incentives and bargaining power. These inefficiencies can also lead to social welfare reductions from a ban on interest. A better appreciation of these inefficiencies would lead to better policy prescriptions for Muslim countries and perhaps reconcile the expectations of Islamic banking's advocates with the reality of Islamic banking today, a point also made by Kuran (1995a). Muslim countries currently do not seem to be in a situation in which a ban on interest increases social welfare.

We conclude from our analysis that although Islamic banks are or should be based on the profit-and-loss sharing principle, given the economic environments in which they operate, using only this type of financing may not be possible. Moral hazard problems suggest the need for some sort of debtlike instrument. The use of markup contracts is a rational response to informational problems. Thus we feel the informational environment will be a more important determinant of the evolution of banking and growth in Muslim countries than will attempts to impose financial systems based on specific religious principles.

LITERATURE CITED

Ahmad, Ausaf. *Development and Problems of Islamic Banks*. Jeddah: Islamic Development Bank, 1987.

Babai, Don. *Arab Banker's Association of North America Newsletter*. 12 (1995), 1.

Bolton, Patrick, and David Scharfstein. "A Theory of Predation Based on Agency Problems in Financial Contracting." *American Economic Review* 80 (March 1990), 93–106.

Chapra, M. Umer. *Islam and the Economic Challenge*. Leicester: The Islamic Foundation, 1992.

Ebrahim, Muhammed S., and Akram Safadi. "Behavioral Norms in the Islamic Doctrine of Economics: A Comment." *Journal of Economic Behavior and Organization* 27 (June 1995), 151–57.

Economist, The. "Islamic Finance: Turning the Prophet's Profits." *The Economist Newspaper* (August 24, 1996), 58–9.

Glaeser, Edward L., and Jose Scheinkman. "Neither a Borrower nor a Lender Be: An Economic Analysis of Interest Restrictions and Usury Laws." *Journal of Law and Economics* 41 (April 1998), 1–36.

Hart, Oliver, and John Moore. "Default and Renegotiation: A Dynamic Model of Debt." *Quarterly Journal of Economics* 113 (February 1998), 1–41.

International Association of Islamic Banks. *Directory of Islamic Banks and Financial Institutions: 1994*. Jeddah: IAIB, 1994.

_____. *Directory of Islamic Banks and Financial Institutions: 1995*. Jeddah: IAIB, 1995.

Jensen, Michael, and William Meckling. "Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure." *Journal of Financial Economics* 3 (October 1976), 305–60.

Kazarian, Elias G. *Islamic versus Traditional Banking: Financial Innovation in Egypt.* Boulder: Westview Press, 1993.

Khan, Mohsin S., and Abbas Mirakhor. *Theoretical Studies in Islamic Banking and Finance.* Houston: The Institute for Research in Islamic Studies, 1987.

_____. "Islamic Banking: Experiences in the Islamic Republic of Iran and Pakistan." *Economic Development and Cultural Change* 38 (January 1990), 353–75.

Khan, Shahrukh R. *Profit and Loss Sharing: An Islamic Experiment in Finance and Banking.* Oxford: Oxford University Press, 1987.

Kuran, Timur. "Behavioral Norms in the Islamic Doctrine of Economics: A Critique." *Journal of Economic Behavior and Organization* 4 (December 1983), 353–79.

_____. "The Economic Impact of Islamic Fundamentalist." In *Fundamentalisms and the State: Remaking Polities, Economies, and Militance*, edited by Martin Marty and R. Scott Appleby, pp. 302–41. Chicago: University of Chicago Press, 1993.

_____. "Islamic Economics and the Islamic Subeconomy." *Journal of Economic Perspectives* 9 (Fall 1995), 155–73 (a).

_____. "Further Reflections on the Behavioral Norms of Islamic Economics." *Journal of Economic Behavior and Organization* 27 (June 1995), 159–63 (b).

Mauro, Paolo. "Corruption and Growth." *Quarterly Journal of Economics* 110 (August 1995), 681–712.

Metwally, Samir. "The Aggregate Balance Sheet and Results of Transactions and Financial Indicators for Islamic Banks and Financial Institutions." *Journal of Islamic Banking and Finance* (1992), 7–61.

Nienhaus, Volker. "Conceptual and Economic Foundations of Islamic Banking." In *Islamic Banks in a Non-Islamic Framework* edited by Gian Maria Piccinelli. Rome: IPO, 1994.

Pourian, Heydar. "The Experience of Iran's Islamic Financial System and Its Prospect for Development." In *Development of Financial Markets in the Arab Countries, Iran and Turkey.* Economic Research Forum for the Arab Countries, Iran, and Turkey, 1995.

Ray, Nicholas. *Arab Islamic Banking and the Renewal of Islamic Law.* London: Graham and Trotman, 1995.

Saffari, Said. "Islamic Banking in Theory and Practice: The Experience of Iran." Center for Middle Eastern Studies Working paper, Harvard University, 1995.

Shallah, Ramadan. "Jordan: The Experience of the Jordan Islamic Bank." In *Islamic Financial Markets*, edited by Rodney Wilson, pp. 100–28. London: Routledge, 1990.

Siddiqi, Muhammad N. *Issues in Islamic Banking.* Leicester: The Islamic Foundation, 1983.

World Bank. *Claiming the Future: Choosing Prosperity in the Middle East and North Africa.* Washington: The World Bank, 1995.