Islamic Economic Studies
Vol. 6, No. 2, May 1999

RISK AND PROFITABILITY MEASURES IN ISLAMIC BANKS: THE CASE OF TWO SUDANESE BANKS[1]

ABDEL-HAMEED M. BASHIR*

The paper examines the effects of scale (total assets) on the performance of Islamic banks. The analysis is done in the context of agency and financial intermediation theories. Using data from two Sudanese banks, our empirical investigation provides limited support to the theoretical predictions. The relationships between size and profitability measures are statistically significant, indicating that Islamic banks become more profitable as they grow in size. However, the negative relationship between size and the ratio of equity to capital implies that the larger bank is systematically highly levered. Moreover, the negative and statistically significant relationship between size and the risk index indicates that large size is economically efficient. The negative and slightly significant relationship between size and market valuation contradicts the predictions of theory.

1. INTRODUCTION

The evolution and spread of Islamic financial institutions in the last two decades have generated interest and discussion among practitioners, economists and policy makers. A growing body of research in Islamic banking and finance is now underway. Meanwhile, the existing research can be divided into two stages. Research in the first stage is considered descriptive and focussing on the conceptual issues underlining interest-free financing (Ahmed 1981, Karsen 1982).[2] In the second stage, the neoclassical techniques were rigorously used to examine the theoretical framework of the Islamic institutions and analyze their behavior (Khan, 1986; Haque and Mirakhor, 1986; Bashir and Darrat, 1992). Yet, the lack of detailed data on bank behavior and operations impeded any comprehensive

*Assistant Professor, Department of Economics, Grambling State University, Grambling, Louisiana, USA.

[1] An Earlier version of this paper was presented at The Fourth Annual Conference of the Economic Research Council, Beirut, Lebanon, September *7-9, 1997.* The ERC financial support is greatly acknowledged. I wish to thank the participants of the ERC Conference, two anonymous referees and the editor of this Journal for their valuable comments.

[2] The Islamic financial system is characterized by the unequivocal prohibition of payment and receipt of *riba* (interest).

empirical analysis of the experience of the last two decades.[3] In my view, tile scarcity of information about Islamic banks is caused by to many factors. First, most of the banking loan contracts are private and, therefore, unavailable to researchers. Second, in most of the countries where these banks operate, financial markets are not well developed. Third, there is no private agencies specializing in gathering and selling information about Islamic banks. Finally, regulators do not hold Islamic banks to periodic disclosure of sufficient information.

Very few attempts have so far been made to empirically analyze the performance of the Islamic banks (see Bashir, Darrat and Suliman, 1993). When Islamic banks were assessed, their financial returns were compared with those of interest-based banks (see Wilson, 1990). Their success was measured by their ability to mobilize and efficiently allocate resources to generate comparable returns for their depositors and shareholder. Yet, the objective is not only to generate comparable returns to their depositors and shareholders only, but also to phase out fixed interest payments and devise flexible and efficient equity participation arrangements consistent with Islamic principles (Karsten, 1982). During the last two decades, Islamic banks succeeded in formulating many creative and flexible profit-sharing instruments that enabled them to compete with their counterparts. Nonetheless, in trying to maximize the value of shareholders' investment, Islamic financial institutions are exposed to risks. Hence, analyzing the performance of Islamic banks is important from economic and public policy perspectives. First, since Islamic banks do not pay fixed returns or guarantee the nominal values of their deposits, moral hazards usually arise. Minimizing the moral hazard problem is critical if Islamic banks have to compete in the deposit and equity markets. Second, by expanding their activities in a van of non-traditional areas will expose them to both financial and operating risk.[4]Reducing the volatility of assets returns is necessary for minimizing the operating risk. From a policy perspective, if Islamic banks are truly riskier than their traditional counterparts, then some sort of regulation (e.g., increased capital standards, or restrictions on bank activities) may be desirable.

This paper is an attempt to apply recent theories of banking firms to analyze the performance of two Sudanese Islamic banks: Faisal Islamic Bank, Sudan (FIBS) and Tadamon Islamic Bank, Sudan (TIBS). Although the choice of the two banks is dictated primarily by data availability, their experiences convey a message about the experience of Islamic banks in Sudan. The rest of the paper proceeds as follows. Section 2 examines the developments of Islamic banks in Sudan, and the economic and political environment during the study period. The performance of both FIBS and TIBS are also highlighted and analyzed. Section 3 is an overview of the relationship between bank size and performance. In this section, our study is related to the literature on economies of scale in banking. Section 4 discusses the

[3] Even when the data are available, the sample size is often inadequate and information is incomplete.

[4] The operating risk is measured by the variability of the rate of return on bank assets.

theoretical foundations of banking models and describes the profitability and risk indicators used in this study. The predictions of two competing theories on bank behavior are highlighted and related to Islamic banking. The data sources and the estimation procedures are discussed in section 5. Section 6 presents and analyzes the empirical results. Section 7 summarizes conclusions.

2. ISLAMIC BANKS AND THE STATE OF SUDANESE ECONOMY

The evolution of Islamic banking in Sudan can be divided into four stages. The first stage commenced in 1977 when the first Islamic bank, Faisal Islamic Bank, Sudan (FIBS), was established. By 1983, three more banks opened: Tadamon Islamic Bank, Sudan (TIBS), Sudanese Islamic Bank, and Islamic Co-Operative Bank. Although Islamic banks were operating in an environment dominated by traditional banks during this period, their growth in terms of assets and deposits was extremely impressive. They managed to mobilize large funds during this period. Furthermore, they were able to pay rates of return that compared well with the rates of interest paid by the conventional commercial banks (see Table 1).

The second stage started in September 1983, when the whole financial system started to be converted to the Islamic model. During the conversion period, two additional Islamic banks were established: Al-Baraka Bank (Sudan), and the Islamic Bank for Western Sudan. This period was characterized by political and environmental crises, which led to structural changes in the country. The third stage started after the downfall of the Nimairi's government in 1985, and ended by the military coup of 1989. During this period, many of the traditional banks reverted back to their conventional practices. On the other hand, Islamic banks were forced to operate in an extremely hostile environment characterized by negative media coverage, lawsuits, and heavy regulations. Meanwhile, the Sudanese economy was suffering from serious structural problems. First, the drought that swept the country in 1985 had led to a severe drop in agricultural production (30% decline). Second, the corrective policy measures adopted by the government were unsuccessful, and later led to a 3.6% decline in GDP. The foreign debt reached a record number ($9 billion), and the trade deficit increased by 11%. The devaluation of the Sudanese pound by almost 90% subjected the banking system to severe exchange rate risks. Moreover, tight monetary and credit regulations were also introduced by the central bank. These unfavorable conditions negatively impacted all sectors of the economy, including the banking system. Nominal rates of return declined or remained constant. By 1984/85 real rates sharply declined as inflation reached new heights (32%). The fourth and final stage started in 1989, when the whole economy was transformed to conform to the Islamic law. The Sudanese economy continued its deterioration and by 1993, real GDP declined by -0.2%, the money supply grew by more than 36% and inflation was in the neighborhood of 80%. Moreover, new monetary and credit control

measures were also introduced by the central bank.[5] For example, commercial banks were required to pay 70% of their profits in taxes (TIBS Annual Reports, 1992, 1993).

These restrictive measures greatly impacted the performance of all financial institutions, including FIBS and TIBS. Yet, the published data implied that FIBS and TIBS have grown in size and market structure during the last decade. Balance sheet figures showed substantial increases in their assets, and a sustained growth in their savings and investment deposits. Most important, the two banks managed to mobilize large funds, generate high revenues, and diversify their investment and financing opportunities. The high revenues they managed to generate led to higher returns on investment deposits and shareholders' dividends.[6] Consequently, this led to the attraction of more investment deposits, especially in foreign currency. In 1993, for example, the return on foreign deposits in TIBS was £.S. 83.2 million, which translate into a 6.8% rate of return. It is, therefore, instructive to investigate the recent performance of Islamic banks in Sudan, despite the fact that the declining economic conditions in the country have negatively impacted the financial development.

Being the first Islamic financial institution established in the country, FIBS dominated the Islamic deposits' market and witnessed an exponential growth in its assets over the years (see Figure 1). In 1984, it accounted for 88% of total deposits of Islamic banks and for around 15% of total bank deposits in the country (Wilson, 1990). In the early years, the bank's rates of returns (on investment deposits and equity) exceeded the interest rates provided by traditional banks (Table 1). Such performance can be explained by the bank's expansion in different geographical and sectoral areas, and by its ability to provide banking services to those depositors whose religious beliefs had always caused them to shun interest-based bank.[7]

The Tadamon Islamic Bank (TIBS), on the other hand, is relatively new (established in 1983) and smaller in size compared to FIBS. However, it showed the same pattern of assets growth as FIBS (see Figure 2), and managed to cover various sectors of the economy. TIBS provided its depositors and shareholders with impressive rates of return during the study period. Furthermore, the bank had diversified its investment portfolios to include direct investment, short term financing, and trading in foreign exchange. Its financial statement showed continuous growth of net profits during the sample period.

---

[5] Commercial banks were directed to apply *90% of* their credit ceilings to finance priority sectors (i.e., agriculture, export, transport, housing and medicine). The remaining 10% could be used to finance domestic trade. The government also liberalized the foreign exchange market an important source of investment to Islamic banks (see TIBS, *1993).*

[6] See Sudanese Banking System and the Islamization Process (1984), and Wilson (1990).

[7] The bank operated a specialized branch facility to provide artisans, handcrafts and small industries with the required tools and equipments. This was an unprecedented example in modem banking practices.

Table 1 below presents the average measures of risk and profitability for FIBS and TIBS during various sub-periods of the sample. It is evident that the average profitability measures of FIBS, followed cyclical behavior. Although the average rates of return were relatively high during the first five years, they declined sharply over the years. Certainly, the economic and political instability in the country during the 1983-89 period had contributed to this unfavorable situation. Market competition is another possible explanation for this volatility. Many new Islamic banks entered the market after 1983. The swing in government actions was yet another factor. On the firm's level, the data show that the operating costs had risen considerably during this period. These costs include administrative expenses, costs of opening new branches, currency devaluation, advertising, and asset management. The horizontal expansion (opening new branches) turned out to be costly, particularly during the worsening conditions of the economy.[8] FIBS' rate of return on equity, ROE, declined sharply in the second half of 1980's as its capital reserve increased.[9]

For TIBS, the profitability measures rose while capitalization and market valuation declined. However, the decline in TIBS' capitalization was expected given the sharp increase in the bank's assets. In fact, the increase in the bank's assets was not accompanied by a similar increase in the bank's capital reserve.

TABLE 1

AVERAGE PERFORMANCE MEASURES COMPARISONS (SAMPLE SUB-PERIODS)

	FIBS				**TIBS**		
	1979-83	83-95	85-89	89-93	83-85	85-89	89-93
Size (£.S. million)	191	446	651	6031	109	306	3098
Equity/Capital (-K)	-0.06	-0.11	-0.10	-0.03	-0.17	-0.10	-0.02
Return on Assets (ROA)	8.7	6.3	5.5	5.9	6.2	6.3	8.0
Return on Deposits (ROD)	14.4	8.2	8.5	10.0	8.3	10.6	9.2
Return on Equity (ROE)	20.6	15.7	6.8	22.0	8.3	8.8	26.11
Interest (deposit)	9.3	12.5	8.0	-	-	8.0	-

[8] The issues associated with branching are improved customer service and convenience resulting from increased number of facilities.

[9] Note that changes in the ROE closely reflect changes in ROA. Increases in capital-to-asset ratios allow ROE to be higher for every value of ROA. The ratio of ROA to ROE (i.e., ROA/ROE) falls as the capital-asset ratio rises.

Interest (savings)	9.9	-	-	-	-	-	-

Source: Author's computations.

The average profitability for the whole sample period is reported in Table 2. It is apparent that the two institutions performed similarly in many respects. Their average rates of return and capitalization were almost equal. The slight advantage of FIBS over TIBS, median returns, may be due to economies of scale induced by size.

TABLE 2

PERFORMANCE AND RISK MEASURES (SAMPLE MEANS AND MEDIANS)*

		FIBS	TIBS
	Number of Observations	15	10
1	Assets (£.S. Millions)	2299 (610)	1653 (481)
	Real Assets	25.95 (19.81)	9.30 (9.23)
2.	RI=(ROA+K)/S	-3.19 (-3.57)	-2.25 (-1.93)
3.	Equity/Capital, -K	-.067 (-.074)	0.73 (0.053)
4.	Return on Assets (ROA)	0.066 (0.059)	0.074 (0.068)
5.	Return on Deposits (ROD)	0.109 (0.100)	.092 (0.083)
6.	Return on Equity (ROE)	0.166 (0.180)	0.167 (0.118)

*Medians in parentheses. Source: Author's Computation.

3. PERFORMANCE AND SIZE: AN OVERVIEW

An in-depth profitability and risk analysis is usually needed if a comprehensive evaluation of bank's performance is required. This is so because 'investigating the risk and profitability measures is expected to indicate how the depositors' and shareholders' funds are used. For example, the profitability measures determine the bank's market valuation and its ability to get funded in the deposit and equity markets. Generally speaking, higher returns are both necessary and sufficient for attracting additional deposits. In order for the bank to compete in equity markets, it

must have sufficiently higher leverage multiplier.[10] This certainly explains the emphasis placed on assets management. In assessing the banking industry, researchers tend to analyze the effects of bank size on its risk and profitability measures. Best performance is almost always indicated by consistent growth in both size (as measured by total assets) and net income (as proxed by its rates of return).

The effect of bank size (measured in terms of the value of total assets) on its performance measures is documented in many recent papers (Boyd and Runkle, 1993; Keeley 1990). The conventional wisdom is that, a small-sized bank has a higher return on assets and a higher capital-asset ratio. A higher capital ratio means a lower leverage multiplier, and hence a lower return on equity. On the other hand, large banks have lower returns on assets and lower capital-asset ratios. This exposes them to higher leverage and higher returns on equity. Meanwhile, different banks' sizes have different policy implications. First, small banks are usually exposed to high risks as indicated by their rates of return on assets. Small banks should, therefore, be forced to hold higher percentage of equity to assets. Second, large banks tend to use more arbitrage transactions than small banks. The extensive use of arbitrage increases size but reduces returns on assets, and lowers capital ratio.[11] Finally, bank regulators perceive that small banks have less diversified portfolios than large banks. Henceforth, adherence to certain capital adequacy requirements is essential to limit banks' risk-taking behavior.

The proponents of large scale raise many points in favor of large bank size. They argue that large size promotes efficiency by inducing economies of scale. Large banks are expected to take advantage of the economies of scale and reduce the costs of gathering and processing information. Large size is also anticipated to enable the bank to be more diversified.[12] A diversified institution is expected to mobilize more funds and, hence, generate high returns to its depositors and equity holders. Furthermore, large institutions are apt to finance a large number of profitable investment opportunities. Finally, because banks have superior access to investment activities, factors affecting their sizes and efficiencies will have an impact on the aggregate economy.[13]

In practice, however, when banks diversify (e.g., expand their activities to nontraditional areas), they are exposed to two broad types of risks: the financial

---

[10] The leverage multiplier is calculated by dividing total assets by total equity. It is equal to the reciprocal of the capital-asset ratio (see footnote 19 below).

[11] Such transactions include the purchase and sell of Federal funds, securitization, and repurchase agreements.

[12] Large size is expected to enable Islamic banks provide a large menu of financial services. Diversification will also minimize the volatility of assets returns and reduce the operating risk.

[13] The factors affecting bank behavior are capital adequacy, riskiness of investments, and monitoring costs.

and the operating risks. While the first type of risk encountered by large banks is triggered by low capitalization, the second type of risk is caused by the riskiness of the bank's asset portfolio.[14] The latter, also referred to as the volatility of the bank's asset portfolio, is measured directly by the variability of the rate of return on assets. Since large banks are sufficiently capitalized and more diversified, both types of risks are expected to decline as size increases.

A number of recent papers (e.g., Samolyk, 1994 and Boyd and Runkle, 1993) used accounting costs and stock prices respectively to provide information on bank performance and profitability. Shepherd (1986), and Goudreau (1992), used Tobin's Q while Berger and Hannan (1989) used banking concentration to measure bank performance.[15] The performance measures we used to analyze the behavior of Islamic banks include profitability (rates of return), and volatility (risk) measures. Based on the prediction of the theory, we expect the Islamic bank's scale of operations (size) to influence its performance measures. Recent studies in Islamic banking (Bashir and Darrat, 1992; Bashir, Darrat, and Suliman, 1993) have supported the size-performance relationship. In the absence of guaranteed nominal returns, large size (measured by capital ratio) was found to impact the bank's performance positively A high capital-asset ratio enables Islamic banks to reduce the financial risk. Moreover, studies of bank behavior (Galloway, Lee and Roden, 1997; Kahane, 1997) have revealed that, without deposit insurance, low capitalization may trigger a "credits crunch". Capitalization also plays the role of collateral and, hence, reduces the consequences of adverse selection.

4. SIZE, PROFITABILITY AND RISK MEASURES

4.1 Theory

Over the last several years, two strands of research in the field of financial institutions have received a great amount of attention. One strand investigates the issue of incentives that motivate banks to take risks (agency theory). Under deposit insurance system, the deposits of large banks are guaranteed by the 'too big to fall' policy. Consequently, the bank managers (the agent) risk depositors' (the principal) funds by making riskier loans. Research on the causes of bank failures revealed that the failing institutions usually pursue risk-taking behavior prior to failure, and that the asset quality is a statistically significant predictor of insolvency. If regulatory treatment is the same for insured banks of all sizes, then the banks' production technologies are unimportant. Under these circumstances, the theory predicts no relationship between size and performance.

---

[14] Capitalization is defined here as the ratio of capital to total assets. The probability that a bank will fail varies inversely with the bank's capital ratio.

[15] Although dividend yields, price-earning ratios, and market-to-book ratios provide market measures of bank performance, accountants and regulators focus on alternative yardsticks for judging bank performance.

The other strand of research focuses on the role of banks (financial intermediation theory) in an environment where market participants are asymmetrically informed. The presence of asymmetric information (adverse selection) increases transaction costs and requires the existence of institutions (delegated monitors) to keep a check on the behavior of investors (see Diamond, 1984). A major rationale for the existence of financial intermediaries is their superior ability to specialize in assessing the credit risks of potential borrowers.[16] The basic premise is that in the absence of financial institutions, informational problems cause financial markets to be incomplete (see Bernanke and Gertler, 1986). By specializing in gathering information about loan projects, and by permitting pooling and risk sharing among depositors, banks help reduce market imperfections and improve the allocation of resources. More important, the financial intermediation theory predicts efficiency gains related to size. The two theories are related in several important ways despite the apparent dichotomy. First, both theories arise from the informational asymmetry 'in financial markets. Second, both theories predict that the quality of bank assets is an important determinant of profitability and performance. Finally, both theories predict that the Modigliani-Miller theorem is inapplicable, opening up the possibility of different predictions on the relationship between the size of the banking firm and its performance.[17]

The Islamic-banking model had recently been analyzed in the context of the principal-agent (moral hazards), and the financial intermediation (adverse selection) theories (see Haque and Mirakhor, 1986; Bashir, 1996). It is imperative to know, however, that the traditional methods of Islamic finance, i.e., the *mudarabah* and the *musharakah,* are akin to the modem principal-agent model. Islamic banks act as agents when they accept deposits, and play the role of the principal when they lend on the basis of profit-and-loss-sharing. However, since the Islamic banks offer no fixed returns nor guarantee the nominal values of their deposits, bank managers have less incentives to pursue risk-taking behavior.[18] Moreover, the absence of deposit insurance and effective regulations exacerbate the problem. High transaction costs will deter the depositors from auditing the bank and checking on what the management is doing (see Mishkin, 1998). This 'costly state verification' will make the profit-sharing contracts less desirable. Consequently, debt contracts (loans) become more prevalent in financial markets than equity (profit sharing) contracts. Accordingly, Islamic banks can be

[16] 16 Pooling of funds will allow the financial intermediaries to take advantages of economies of scale and permits diversification as well as specialization and division of labor.

[17] A particular balance sheet variable upon which we focus is net worth (equity capital). A bank with a high equity has incentives to follow a low-risk strategy to avoid big losses during times of financial stress. However, high capital accounts have both benefits and costs. It reduces insolvency, but also it reduces the rate of return on equity.

[18] An effective regulatory system must restrict not only the bank's incentives, but also its opportunities to take excessive risk.

considered as portfolios of risky claims, and the theory predicts no relationship between their sizes and performance.[19] If these predictions are true, immediate regulatory treatment of Islamic banks is needed since their failure is more likely to result into macroeconomic externalities.[20]

As financial intermediaries, Islamic banks specialize in evaluating and monitoring their equity-financed ventures to reduce the moral hazard and adverse selection. Equity financing gives them access to information and enables them to guide the course of their borrowers. Compatible interest in the performance of the financed projects will, therefore, prevail between the bank, its depositors, its equity-holders, and its investment partners. The bundling of deposits and equity claims into a single entity (i.e., the borrower-shareholder bank) is a more efficient way to capture the economies of scope in monitoring. Furthermore, as they grow in size, they become more diversified and less risky. Hence, the financial intermediation theory predicts that large size reduces the deadweight loss of monitoring and impacts bank performance.

4.2 Profitability and Risk Measures

The profitability measures used in this study include the rate of return on assets (ROA), the rate of return on equity (ROE), the rate of return on investment-deposits (ROD), and the capital-assets ratio (capitalization). The rate of return on assets, ROA, is the most comprehensive *accounting* measure of a bank's overall performance. Since it is defined as net income over total assets, it shows the profit earned per dollar of assets. It is an indicator of bank efficiency and a measure of the bank's ability to earn rent from its total operations. More important, it gauges how effectively a bank uses its financial and real investments to generate profits. Large size is, therefore, predicted to reduce ROA.

The ROE, on the other hand, reflects how effectively a bank management is using shareholders' investment. It tells the bank's shareholders how much the institution is earning on the book value of their investment (see Goudreau, 1992). In fact, the return on equity is the most important measurement of banking returns because it is influenced by how well the bank has performed on all other return categories, and indicates whether a bank can compete for private sources in the economy. Accounting ROE, defined as net income divided by average equity, measures bank accounting profits per dollar of book equity capital. However, accounting ROE should not be confused with investment profitability (or return) as measured by dividends and stock-price appreciation. Furthermore, ROE can be

[19] According to the agency theory, the Islamic bank acts as an *agent* in investing the depositors' funds, while the depositors are the *principals.* The moral hazard problem that arises from this relationship will give the bank incentives to take risk.

[20] Risk-control regulations include periodic monitoring and timely foreclosure of insolvent banks. The traditional risk-control devices are bank charter value (the value of the right to continue to operate) and regulatory restrictions on entry and competition.

decomposed into a leverage factor (equity multiplier, EM) and return on assets (ROA). The equity multiplier (defined as assets divided by equity) is the reciprocal of the capital-to-asset ratio. It provides the gauge of a bank's leverage (debt-to-asset ratio), or the dollar amount of assets pyramided on the bank's base of equity capital.[21] Whereas ROA measures profitability from the point of view of the overall efficiency of a bank's use of its total assets, ROE captures profitability from the shareholders' perspective.

A third measure of profitability is ROD. ROD is defined as net income divided by total investment deposits and shows the ability of the bank to compete for funds. ROD can be considered as the price, or the cost of attracting deposits. If the bank becomes more efficient in gathering deposits and transforming them into profitable investments, the dollar value of deposits becomes more valuable. The bank would then bid for more deposits by offering higher profit-sharing ratios. Although this may increase bank size, the relationship between size and ROD is ambiguous.

To provide a more accurate measure of the bank's rent (profitability), previous studies have combined market data with accounting data to predict the bank's growth opportunities (see Keeley, 1990). An attractive theoretical measure to capture the market valuation is Tobin's Q, defined as the ratio of the bank's market value to the replacement cost of its assets. When market data is used, the replacement cost is assembled as the sum of the book value of liabilities and the market value of equity. Market valuation is predicted to be positively related to size.[22]

The riskiness of the bank's overall operations is captured by the volatility of the bank asset portfolio and the size of bank capital cushions as reflected in capital ratio. The standard measure of the variability of assets is the standard deviation of ROA (σ_{ROA}).[23] The ROA and its variability are combined with the bank's capital ratio (equity/asset) to generate a risk index (RI). The risk index measures how much a bank's accounting earnings can decline before it has a negative book

---

[21] ROE = ROA x EM, where EM = asset/equity = 1/CAP, is the equity multiplier. Moreover, the bank's leverage index is given by: debt/asset = (1-1/EM). Given the direct relationship between ROE and ROA, we expect ROE to decline with large size, *ceteris paribus.*

[22] Earlier attempts to assemble a measure of market valuation were unsuccessful, and were dropped at the suggestion of an anonymous referee.

[23] To earn adequate returns, a bank must take risks. The risk measures are related to the return measurements. However, trade-offs generally exist between returns and risks. For example, a shift from short-term assets to long4erm assets or loans raises a bank's returns but also increases its liquidity risk. The capital risk, on the other hand, is inversely related to the leverage multiplier, and therefore, to the return on equity. If a bank chooses (or is forced to choose) to lower its capital risk, its leverage multiplier and ROE will decline.

value.[24] It gauges the riskiness of the book value cushion a bank has available to absorb accounting losses. What makes the risk index appealing is that it includes ROA (the most widely accepted accounting measure of overall bank performance), the variability of ROA, and the book capital adequacy (an industry standard for bank safety and soundness). We expect size to impact the risk index negatively.

5. THE DATA AND ESTIMATION PROCEDURE

The methodology employed in this paper is designed to investigate whether the bank scale (size) enhances its performance, or, alternatively, whether there are any efficiency gains related to size. The data used in this study are compiled from the banks' annual reports and from pervious studies (Wilson, 1990). Reported returns and the book values of assets were used as proxies for profitability and size respectively. There are important drawbacks to this approach, however. First, balance sheet and income statement data offer only imprecise measures of actual costs, net worth, and earnings because of the book value accounting practices in banking. Second, the bank's accounting value does not fully and completely reflect its market value. The book values are the only available reasonable approximations. Third, since the analysis is done with very few observations, the results must be cautiously interpreted. Finally, the self-selected nature of our sample implies that the results are not easily generalized to the over 200 institutions we were unable to study. Nonetheless, analyzing the bank performance using the balance sheet and the financial statement is important for many reasons. First, accounting models of valuation and performance are easy to use (see Sinkey, 1997). Second, although accounting data is subject to measurement errors, these errors are likely to be less pronounced for Islamic banks because the overwhelming majority of their portfolios are short-term loans. Third, the use of stock (market) data confines the study to few banks with traded shares of equity. Finally, bank regulators pay more attention to accounting data than to market data.

Given the small size of our sample (15 years for FIBS and 10 years for TIBS), an OLS regression is run for each institution separately.[25] The data is then pooled and a panel data regression is run for the two institutions combined. In each case we estimated univariate relationships relating profitability and risk measures to the bank's size.[26] The estimated coefficients are corrected for conditional hetroskedasticity using White's (1980) method.

---

[24] The risk index RI = [E (ROA) + CAP]/σ_{ROA}, where E (ROA) is the expected value of ROA, CAP is the capita-asset ratio, K, and σ_{ROA} is the standard deviation of ROA about its average, is the statistical measure of variability. In finance, the standard deviation of returns is a common measure of a portfolio's riskiness (see, Sinkey, 1998).

[25] The sample period for FIBS is 1979-1993, and the period for TIBS is 1984-1993.

[26] Since the estimation of univariate equations may lead to misspecification bias, and the fact that the independent variable, log (size) may depend on the left-hand variable, an alternative estimation procedure (2SLS) was tried as a remedy, but no significant change in

In this study, we used the natural logarithm of total assets as a proxy for the independent variable (size).[27] The profitability indicators, ROA, ROD, and ROE were obtained from the banks' annual reports (see Appendix). Capitalization is calculated by finding the ratio of total equity capital to the value of total assets. Since size is expected to confer diversification advantage, these profitability measures are expected to be positively impacted by the scale of the bank. The RI index is compiled as the deviation of ROA from the capital-asset ratio, -K, and scaled by the standard deviation of the ROA. Since the standard deviation is used to measure financial risk, the RI variable is introduced to gauge the volatility of assets returns. According to the financial intermediation theory, volatility is inversely related to size.

5.1 Testing for Non-stationarity

For high inflation countries like Sudan, nominal aggregate time series variables are very likely to be non-stationary. Trended or non-stationary data usually produces "spurious" or misleading results (Granger and Newbold, 1974). To test for non-stationarity or the unit root, we run the following regression equations:

$$\Delta Y_t = \beta_0 + \beta_1 Y_{t-1} + \varepsilon_t \qquad (1)$$

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \epsilon_t \qquad (2)$$

where $\Delta Y_t = Y_t - Y_{t-1}$. The series Y_t, Y_{t-1} are the dependent and independent variables under investigation respectively. If the estimated $\beta 1$ in equation (1) is significantly less than 0, we reject the null hypotheses of non-stationarity (see Studenmund, 1997, pp. 490). On the other hand, if $\alpha_1 = 1$ in equation (2), then Y_t is characterized by a random walk, i.e., has a unit root. The results of testing for non-stationarity of every variable for each institution are shown in Table 3 below:

OLS results was found. Remember, however, that 2SLS is a large sample procedure. With the small size we have, it is natural that the result is similar to OLS. We thank an anonymous referee for directing our attention to this point.

[27] The natural logarithm is used because of the large variations on the value assets over the sample period. Disparity between the largest and smallest observed values may cause hetroscedasticity in the error term. The log is used to reduce disparity in values.

TABLE 3

STATIONARITY TESTS

$$\Delta Y_t = \beta_0 + \beta_1 Y_{t-1} + \varepsilon_1$$
$$Y_{t=}\alpha_0 + \alpha_1 Y_{t-1} + \epsilon_1$$

#	FIBS	TIBS
	n=15	n=10
1.	$\Delta ROA_t = .0267 - .410\ ROA_{t-1}$ $\tau = (2.137)\ (-1.8587)$**	$\Delta ROA_t = .0368 - .4796\ ROA_{t-1}$ $\tau = (1.314)\ (-1.084)$
2.	$\Delta ROE_t = .044 - .2326\ ROE_{t-1}$ $\tau = (1.587)\ (-1.6497)$*	$\Delta ROE_t = .0465 - .0882\ ROE_{t-1}$ $\tau = (1.375)\ (-.3196)$
3.	$\Delta ROD_t = .0655 - .6417\ ROD_{t-1}$ $\tau = (1.8867)\ (-2.1105)$**	$\Delta ROD_t = .0616 - -.6619\ ROD_{t-1}$ $\tau = (1.7513)\ (-1.4120)$*
4.	$\Delta K_t = .0180 - .2604\ K_{t-1}$ $\tau = (-.8121)\ (-1.1373)$	$\Delta K_t = .5977\text{-}02 - .1751\ K_{t-1}$ $\tau = (1.2979)\ (-3.9344)$***
5.	$ARI_t = .5817 - .1816\ Z_{t-1}$ $\tau = (.7557)\ (-.9291)$	$\Delta RI_t = - .4422 - .3005\ Z_{t-1}$ $\tau = (-2.4458)\ (-4.716)$***
6.	$In(Size)_t = .408 + 1.006\ ln(Size)_{t-1}$ $\tau = (.864)\ (13.192)$***	$In(Size)_t = .0264 + 1.0778\ In(Size)_{t-1}$ $\tau = (.093)\ (23.862)$*

* Significant at 10%, ** Significant at 15% *** Significant at 1%

Using Dickey-Fuller (1979) test for stationarity, all data series for FIBS were found to be non-stationary, except for ROD. Moreover, the series on ln(Size) were found to have a unit root. For TIBS, all the series were non-stationary and have unit roots except for the series on ln(Size). To rid the series from non-stationarity, the traditional procedure is to take the first difference. If the differenced series are stationary, we say that the original series is integrated.[28]

[28] If both the dependent variable(s) and the independent variable are non-stationary to the same degree, then the series are co-integrated. In such a situation there is a reasonable possibility that the non-stationarity in the two variables will "cancel each other out." OLS estimates would not be spurious (see Studenmund, 1997, pp. 491, Gujarati, 1995, pp. 719).

6. THE EMPIRICAL EVIDENCE

Given the non-stationarity results, we use OLS to estimate the following two equations (for the two banks and the pooled series) for the integrated and the stationary series respectively:

$$\Delta X_t = \delta_0 + \delta_1 \Delta \ln (Size) + u_t \quad (3)$$
$$X_t = \theta_0 + \theta_1 \Delta \ln (Size) + v_t \quad (4)$$

Where X_t is the dependent variable, and u_t and v_t are error terms.

The OLS results of regressing performance and risk measures on bank size [the natural logarithm of total assets, In (Size)] are reported in Table 4. Row (1), shows the result of regressing ARI on size for both institutions. The result indicates that there is a negative and statistically significant relationship between size and the RI index. The statistical significance is an indication that large size induces diversification and, hence, reduces risk. The ratio of equity to capital, -K, is negatively related to size, and statistically significant for TIBS, The result also reveals a positive and marginally significant [under a high level of significance (90%)] relationship between size and ROA in the equation of FIBS. For TIBS, size is negatively and insignificantly related to ROA. Meanwhile, size and the rate of return on equity, ROE, are strongly positively correlated in the case of FIBS. This result certainly supports the financial intermediation theory: as banks become large in size, they become more profitable. The correlation is negative but statistically insignificant in the case of TIBS. Finally, the rate of return on equity, ROD, appears to be positively related to size for the case of FIBS (negative for TIBS). Yet, in both cases the results are statistically insignificant.

TABLE 4

PERFORMANCE AND RISK MEASURES REGRESSED ON ln (Size) OLS Estimation

$$\Delta X_t = \delta_0 + \delta_1 \Delta \ln (Size) + u_t$$
$$X_t = \theta_0 + \theta_1 \Delta \ln (Size) + v_t$$

#	FIBS (1979-93) Coefficients			TIBS (1984-93) Coefficients	
	Var.	Con.	(ΔlnSize)	Cons	(ΔlnSize)
1.	ΔRI_t	.1059	-0.2040 (-2.252)**	.5596	-0.6916 (-1.376)*
2.	ΔK_t	.605-03	-0.394-02 (-0.052)	-.0414	-0.0425 (-2.580)***
3.	ΔROA_t	-.3788	-.807 (1.541)*	.5261	-0.2477 (-0.073)
4.	ΔROD_t	.0912	0.033 (0.549)	1.5864	-3.2499 (-0.475)
5.	ΔROE_t	-.2081	2.0584 (2.015)**	-1.6577	8.780 (0.371)

*Significant at 10% **Significant at 5% ***Significant at 1%

Table 5 below, presents the results of the same regressions as those performed in Table 4, except for the fact that the data in Table 5 are adjusted for inflation.[29] The adjusted data were also tested for stationarity before running the regression. As expected, the data on size (for both institutions) were found to be stationary. All the non-stationary data were made stationary by taking the first difference.

Interpreting the OLS results, Row (1) of Table 5 shows a negative relationship between size and the risk index for both FIBS and TIBS respectively The relationship between size and the RI index is also statistically significant for both institutions. This result is consistent with the assumption that the variability of ROA (the denominator of RI) increases with bank size. Row (2) displays an inverse and statistically significant relationship between size and the ratio of equity to assets, -K, for TIBS. The correlation is negative but not significantly different from zero for FIBS. The rates of return on assets, ROA, deposits, ROD, and equity, ROE, are all positively related to size and significantly different from zero, for FIBS (see Row 3, 4, and 5). However, the results are not statistically significant for

[29] The data is adjusted for inflation by using 1990 as the base year. All the data series were deflated using the base year price. We thank an anonymous referee for directing our attention to this point.

TIBS. In general, the positive and statistically significant relationship between the profitability measures and bank size contradicts the proposition that bank size is irrelevant. These findings, which suggest that larger banks are riskier than smaller banks, are consistent with the conventional wisdom that smaller banks are more risk-averse than larger ones.

To investigate whether the regression results are sensitive to the choice of the data, we compare the results of Table 4 and Table 5. Apart from slight differences in the signs of the parameter and their statistical significance, the results are the same. Macroeconomic instability caused by inflation might have been a factor behind the discrepancies. The fact that the results are statistically significant in both sets of data implies that they are robust. Furthermore, the results indicate how size can explain the rates of returns offered by Islamic banks.

TABLE 5

PERFORMANCE AND RISK MEASURES REGRESSED ON ISLAMIC BANKS' SIZE

ANNUAL ADJUSTED DATA 1979-1993+

$X_t = \theta_0 + \theta_1 \ln (RSize) + v_t$

#	**FIBS (1979-93)**			**TIBS (1984-93)**		
	Coefficients			Coefficients		
	Var.	Cons.	ln (RSize)	Var.	Cons.	ln (RSize)
1.	ΔRI_t	.0615 (.479)	-1.0591 (-1.599)*	ΔRI_t	-4.223 (-3.246)	1.9973 (3.528)***
2.	$-\Delta K_t$	.1099-02 (.141)	-.0208 (-.579)	$-\Delta K_t$	-.1454 (-2.003)	.0738 (2.248)**
3.	ΔROA_t	-5.8997 (-.9725)	27.065 (2.024)**	ΔROA_t	-81.154 (-.326)	33.094 (.305)
4.	ΔROD_t	-6.3767 (-1.028)	21.6666 (1.6194)*	ΔROD_t	-128.819 (-.718)	54.4675 (.690)
5.	ΔROE_t	-5.1722 (-.996)	28.5181 (2.3282)**	ΔROE_t	-98.3871 (-.296)	42.1124 (.290)

+1990 prices. t-values in parentheses. *Significant at 10%. **Significant at 5%. ***Significant at 1%

Finally, the model is estimated using panel data. Panel estimation is an important procedure for estimating linear regression models because it provides asymptotically efficient estimates for fixed and random effect models.[30] In our case, however, panel estimation has an advantage because it increases the number of observations (25). The results of the panel estimation are shown in Table 6.

[30] Panel computes and reports Hausman test statistic for correlated effects by comparing the random (VARCOMP) and fixed (WITHIN) estimators.

Rows (1) through Row (3) of Table 6 show that size has strong negative effects on the capital-asset ratio, -K, the risk index, IR, and the rate of return on deposits, ROD. Only the ROE is positively impacted by size. The other two profitability measures were not positively impacted by size. Furthermore, the panel estimation strongly supports the predictions of financial intermediation theory that there are efficiency gains related to bank size.

TABLE 6
PERFORMANCE AND RISK MEASURES REGRESSED ON SIZE
PANEL DATA ESTIMATION

Dep. Variable	Coefficient	t-value	R^2	Hausman Test
Equity/Assets, CAP+ -K	-.014	-2.731***	.24	.000
RI-index, (ROA+CAP)/σ	-.401	-3.022***	.85	.321
ROD	-1.252	-1.977**	.63	.031
ROA	0.107	0.990*	.97	.588
ROE	2.805	2.147***	.67	.624

* Indicates significantly different from zero at 90%.
**(***) Indicates significantly different from zero at 95% (99%).

7. CONCLUSION

The paper analyzed the performance of Islamic banks in Sudan, focussing on two institutions: FIBS and TIBS. On the basis of published data, we analytically and empirically examined the implications of the bank's scale on profitability and risk measures. Our analytical results showed that, while FIBS and TIBS grew in size in nominal terms, their sizes declined in real terms. Consequently, their rates of returns showed volatile behavior. Using both nominal and real data, the empirical results gave support to the financial intermediation theory. Despite the limitation of published data, banks' performances seemed to be impacted by their scale of operations. The significant negative effect of the risk variable implies that, as the Islamic banks grow in size, the operating risk decreases. This result strongly supports the intermediation theory, which confers a diversification advantage as size increases. Finally, it is important to underscore the limitations of the empirical work presented here. The two banks studied here are not necessarily representative of the large number of Islamic banks operating worldwide, nor do they represent the banking industry in their home country.

APPENDIX

The variables used in the regression are calculated as follows:

Let π = net profit (income), A^B = book value of assets, L^B = book value of liabilities,

E^B = book value of equity, and D^B = book value of deposits, ID^B =book value of Investment Deposit. Then:

ROA = net income/ book value of consolidated assets (ROA = π/A^B)

ROD = net income/ book value of total deposits (π/D^B)

ROE = net income/ book value of equity capital (π/E^B)

RI = (K+ROA)/σ, where K is the sample mean of - k = E^B/A^B

σ = sample standard deviation of ROA.

ROE = ROA x EM, where EM is the equity multiplier.

EM = I/CAP, where CAP is the capital/asset ratio, -K.

Bank leverage = deposit/asset ratio = (1-1/EM)

REFERENCES

Ahmed, K. (198 1), *Studies in Islamic Economics,* UK.: Islamic Foundation.

Ahmed, O. (1990), "Sudan: The Role of Faisal Islamic Bank" in Rodney Wilson: *Islamic Financial Markets,* Routledge.

Bashir, A. (1996) "Profit-sharing Contracts and Investment under Asymmetric Information", *Research in Middle East Economics,* Vol. 1, pp. 173-186.

Bashir, A. (1994), "The Performance of Islamic Banks: The Case of Faisal Islamic Bank", a paper presented at the International workshop on Islamic Political Economy in Capitalist Globalization, December 12-14, Penang, Malaysia.

Bashir, A., A. Darrat, and O. Suliman (1993), "Equity Capital, Profit Sharing Contracts, and Investment: Theory and Evidence", *Journal of Business Finance and Accounting,* Vol. 20, No. 5, pp. 639-65 1.

Berger, A., and T Hannan (1989), "The Price-Concentration Relationship in Banking", *Review of Economics and Statistics,* Vol. 71, No. 2, pp. 291-299.

Boyd, J., and D. Runkle (1993), "Size and Performance of Banking Firms: Testing the Prediction of the Theory", *Journal of Monetary Economics,* Vol. 31, pp. 47-67.

Diamond, D. (July 1984) "Financial Intermediation and Delegated Monitoring", *Review of Economic Studies,* Vol. 51, pp. 393-414.

Dickey, D., and W. Fuller (June 1979), "Distribution of the Estimators for Autoregressive Time Series With Unit Roots", *Journal of the American Statistical Association,* Vol. 74, No. 366, pp. 427-431.

_____, (July 198 1), "Likelihood Ratio Statistics for Autoregressive Time Series With Unit Roots", *Econometrica,* Vol. 49, No. 4, pp. 1057-1072.

Economic Research Department, Bank of Sudan (1984), *Sudanese Banking System and the Islamization Process* (Arabic), Khartoum.

Faisal Islamic Bank: *Annual Reports:* 1985, 1986, 1987, 1988, 1989-93.

Galloway, T., W. Lee, and D. Roden, (1997), "Banks' Changing Incentives and Opportunities for Risk Taking", *Journal of Banking and Finance,* Vol. 21, pp. 509-527.

Goudreau, R. (1992), "Commercial Banks Profitability Rises as Interest Margins and Securities Sales Increase", *Economic Review: Federal Reserve Bank of Atlanta,* Vol. 33.

Gujarati, D. N. (1995), *Basic Econometrics,* Third Edition, McGraw-Hill Publisher.

Haque, N., and A. Mirakhor (1986), "Optimal Profit-Sharing Contract and Investment in an Interest-Free Economy", Working Paper, Washington: International Monetary Fund.

Hempel, G., D. G. Simonson, and A. B. Coleman (1994), *Bank Management: Text and Cases,* Fourth Edition, New York: Wiley and sons.

Kahane, Y (1977), "Capital Adequacy and Regulation of Financial Intermediaries", *Journal of Banking and Finance,* pp. 207-218.

Karsen, 1. (1982), *Islam and Financial Intermediation,* IMF Staff Papers, Vol. 29.

Keeley, M. (1990), "Deposit Insurance, Risk, and Market Power in Banking", *American Economic Review,* Vol. 80.

Khan, M. (1986), *Islamic Interest-Free Banking: A Theoretical Analysis,* IMF Staff Paper

Kim, Sun Bae (1991), "The Use of Equity Positions by Banks: The Japanese Evidence", *Economic Review: Federal Reserve Bank of San Francisco,* No. 4, Fall.

Levonian, M. (1991), "Have Large Banks Become Riskier? Recent Evidence from Options Market", *Economic Review: Federal Reserve Bank of San Francisco,* No. 4, Fall.

Mishkin, F. S. (1998), *The Economics of Money, Banking, and Financial Markets,* Addison-Wesley, 5th Edition.

Samolyk, K. (1994), "U.S. Banking Sector Trends: Assessing Disparities in Industry Performance", *Economic Review, Federal Reserve Bank of Cleveland,* quarter 2.

Shepherd, W. (1986), "Tobin's Q and the structure-Performance Relationship: Comment", *The American Economic Review,* Vol. 76, No. 5.

Sinkey, J. F, Jr. (1998), *Commercial Bank Financial Management,* Fifth Edition, Upper Saddle River, New Jersey: Prentice Hall.

Smirlock, M., I Gilligan, and W. Marshall (1984), "Tobin's Q and the Structure-Performance Relationship", *American Economic Review*, Vol. 74, No. 5.

Studenmund, A. H. (1997), *Using Econometrics*, Third Edition, Addison-Wesley.

Tadamon Islamic Bank: *Annual Reports*, 1984 to 1993.

Thomas, L. B. (1997), *Money, Banking, and Financial Markets*, McGraw-Hill.

Wilson, R. (1990), *Islamic Financial Markets*, London: Routledge.

FIGURE 1

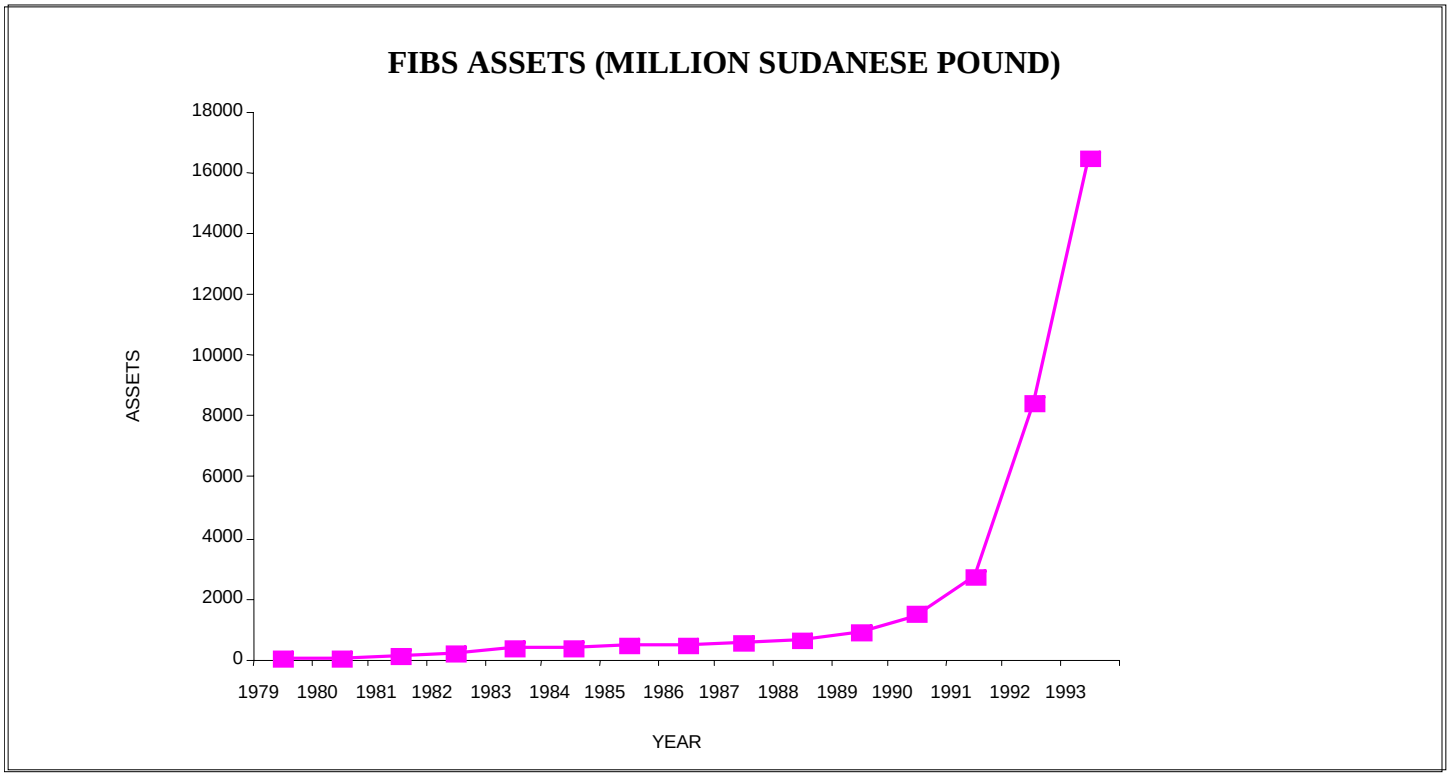
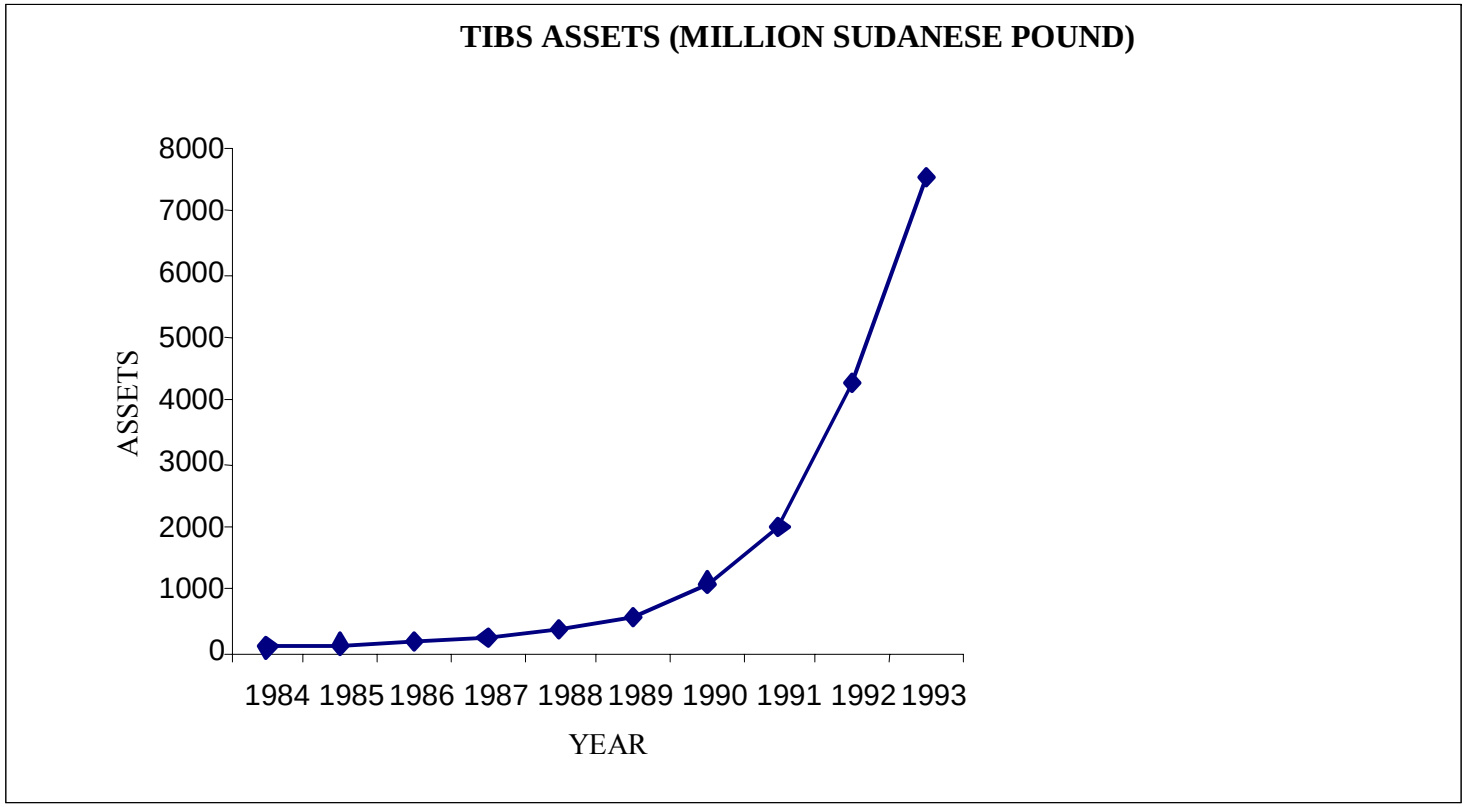

FIBS ASSETS (MILLION SUDANESE POUND)
ASSETS
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993
YEAR

FIGURE 2


TIBS ASSETS (MILLION SUDANESE POUND)
8000
7000
6000
5000
4000
3000
2000
1000
0
ASSETS
1984 1985 1986 1987 1988 1989 1990 1991 1992 1993
YEAR