Determinants of Commercial Bank Interest Rate Margins: Evidence from Jordan

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ABSTRACT

This study examines the determinants of bank net interest rate margins within the context of the Jordanian banking industry. The empirical specification focuses on the reported net interest rate margin that is assumed to be a function of two sets of variables that are incorporated, those are namely bank-specific characteristics (internal variables), and macroeconomic factors, which are used to control for the external variables. However, the study model is tested on time series cross-sectional bank level data in the context of Jordan, in which, the basic model of study uses the linear form with the two targeted categories of variables. For testing purposes, panel data analysis is used by employing three alternative models to estimate the parameters of the model i.e., the Pooled Least Squares (OLS) model, the Fixed-Effect Model and the Random Effect Model (REM). The sample used in this study consists of a panel data set for thirteen commercial banks over the period 1992 - 2005.

The results suggest that, with respect to bank-specific characteristics, higher net interest margin tend to be associated with banks that keep less financial leverage and grant more loans. The operation cost proxy shows that banks overhead costs are passed over to clients in the form of high lending rates and/ or lower deposit rates. The capitalization proxy indicates that banks are well-capitalized, reflecting lower bankruptcy costs. Under the loan-to-asset proxy, it seems that banks are able to maintain low levels on non-performing loans, and hence attain higher interest margins. The size factor has a significant impact in enhancing banks performance in order to remain competitive. Erratically, the effect of market share on banks' margin indicates that Jordanian banks do not exercise market power in setting prices, and banks that are operationally less efficient gain reasonable net interest margin. The macroeconomic variables show no significant impact on banks net interest margins. However, the positive impact of the growth rate variable indicates that movements to deregulation together with technology advances would lead to improvements in the overall banking businesses, causing higher spreads, and hence, higher net interest margins. The result related to the inflation factor suggests that banks tend to profit from inflationary environment by charging higher loan interest rates, and therefore, higher net interest margins.

Keywords: Net interest margin, Financial leverage, Liquidity crisis, Jordan.

INTRODUCTION

Worldwide, while profitable banking enterprises are better able to hold up negative shocks and contribute to the stability of most economies, poor performance, as extreme consequence, will lead, in most cases, to failure. Such result

may be attributed to numerous factors including, for example, high loan default, liquidity crisis, inadequate capital, lower provision, undiversified loan as well as deposit portfolios.

Under this concern, we cannot deny the supervisory attributes, in which "movement towards deregulation had created more open and competitive environment, leading to a much wider variety of financial services and causing major changes in the market structure, technology,

distribution arrangements and financial products" (Al-Abadi, 2005, p.35-36). All caused an increased competition pressures among banks, leading to a crucial impact on banks' wholesale and retail businesses, and hence their profitability typified by banks' spread or net interest rate margins. Practically, as reported by Al-Abadi (2005, p.34), during the early stages of the second half of 1990s, banks faced increased competition, causing the need to compete by squeezing the size of their spreads and margins, reflecting a diminishing ability of banks to sustain loan losses.

In reality, banks' interest rate spread or Net Interest Rate Margins (NIM) represents a vital component of profitability and typified a summary measure of bank net interest rate of return. Of which, interest margin reflects both the volume and mix of a bank's assets and liabilities, and covers the costs of the intermediation function. In Jordan, given the variations in banks profitability, and the need to generate an adequate level of interest margins in relation to profitability, the issue of how those margins are determined and adjusted to changes in the banking industry deserves more attention.[1]

This study tests for the determinants of net interest rate margins within the context of Jordan. The study spans over the period 1992 – 2005, inclusive. To undertake this object, a set of variables, namely bank-specific and macroeconomic variables, are regressed against net interest margin using the basic model of Demirguc-kunt and Huizinga (1999)[2], Ben Naceur and Goaied (2001 and 2005). More precise, this study intends to demonstrate how the determinant factors jointly determine banks net interest rate margins, by testing whether a related internal factors i.e., operating costs, capital to-asset-ratio, loan-to-asset ratio, the bank size, market share, in addition to external factors i.e., economic growth, inflation, exchange rates, could be accepted as explanatory variables that have an impact on banks net interest rate margins. Testing for this issue is of great importance since the competitive conditions in the Jordanian banking industry have been

changed due to liberalization, globalization, together with some banks failure since 1989.

The rest of this study is organized as follows. Section 2 provides a background and an overview of the related literature. Methodology specification and data description are provided in section 3. In which the economic rationale, sample and data specification are given, the proxies and initial tests are specified as well. Section 4 presents the estimation results and discussions. We conclude the empirical tests with a summary of the results and its implications in section 5.

LITERATURE REVIEW

The issue of testing for the determinants of interest rate margin has been under the focus of several financial and banking literatures. Such concern is stimulated from the crucial role made by the interest margin towards banks', as main financial intermediaries, profitability as well as stability, reflecting direct influence on economic growth i.e., the impact made on net return to savings and the gross return for investment. However, the need to provide better understanding of the behavior of interest rates following the mixed experiences of many Less Developed Countries (LDCs) with interest rate liberalization is another attribute behind examining the determinants of interest rate margin. Furthermore, there has been a growing concern, in the developing countries in specific, toward the level and structure of interest rates that are remained inflexible with high interest rate margins during the post-liberalization period. Finally, yet importantly, the use of interest rate margin as a parameter of bank profitability, intermediation cost and financial market efficiency gave impetus to further research, (Randall, 1998).

In practice, while interest margin between lending and deposit interest rates is a key variable in the financial system, it reflects the additional cost of borrowing related to intermediation activities performed by banks in linking borrowers with the ultimate fund lenders. When spread is too large, it can contribute to financial disintermediation as

it discourages potential savers with too low returns on deposits and limits financing for potential borrowers, causing a reduction in the feasible investment opportunities and therefore the growth potential of the overall economy.

Nevertheless, given that high interest rate margins that have usually been associated with inefficiency, it may also result in the strengthening of a country's banking system. This may be attained when profits earned from high spreads are being channeled by the intermediary firms to their capital bases. This was observed in Colombia, as reported by Barajas *et al.*, 1999, in which high bank interest rate spreads and healthy capital ratios are both notified.

In contrast, as reported by Doliente (2003), very low spreads cannot be always taken positively, especially in poorly regulated, but liberalized, environments. Under which certain mechanisms ensuring the intervention in poorly capitalized or unstable banks are absent. Under such issue, if weak banks are allowed to operate, there is the likelihood that they will adopt the strategy of offering lower loan rates to gain additional market share or to grow out of their troubles. This was presumed in some Latin American countries in the period after financial liberalization reforms were instituted over the last decade (Brock and Saurez, 2000).

Overall, studies on the determinants of bank's interest rate margins are varied according to their focus on a particular country level or by using cross-countries panel data. However, Ho and Saunders (1981), McShane and Sharpe (1985) and Allen (1988) have provided models of bank interest margins based on the bid-ask spread model of Stoll (1978a and 1978b). McShane and Sharpe (1985) used a modified version of the Ho and Saunders (1981) model and conducted an empirical test of the spreads of trading banks.

By using the dealership model, Ho and Saunders (1981) revealed that bank net interest margins of the region are explained by the level of a bank operating expenses, capital, loan loss reserves, collateral and liquid assets. Further, they show that the region's net interest margins are sensitive to

changes in short-term interest rates and that there is a non-competitive structure in the region's banking systems. This result is supported later by Doliente (2003). Hanson and Rocha (1986) examined the determinants of interest rate margins by looking at the role of explicit and implicit taxes and other factors like bank costs and profits, inflation, scale economies and market structure. Using aggregate interest rate data for 29 countries for the period 1975-83, Hanson and Rocha (1986) found a positive correlation between interest rate margins and inflation.

Allen (1988) extended the Ho and Saunders (1981) model from a structure with one kind of loan and deposit-to-loans and deposits with many maturities. Zarruk (1989) and Zarruk and Madura (1992) developed a model assuming a setting in which the bank is subject to the prevailing capital regulation and deposit insurance. By using Canadian data, Yu (1995) tested a number of hypotheses reporting banks' interest rate margins based on risk-neutral bank objective function which aimed to maximize the return on equity capital. Yu (1995) study revealed a consistent size-effect in the determination of interest rate margins. Further, the study concluded that the interest margin is increased with bank capital-to-asset ratio, implying that the increase in the cost of capital, which results from bank capital regulation, seemed to be transferred to borrowers. However, no direct link between interest margins and bank non-interest expenses is identified.

Wong (1997) extended his model to account for cross-elasticities of demand among bank products (Allen, 1988), and default risk (Angbazo, 1997). He followed the 'cost of goods sold' approach that was introduced by Finn and Frederic (1992). By incorporating a proxy of market structure, Wong (1997) concluded that bank interest margin is positively related to bank's market power, operating costs, credit risk and the degree of interest rate risk. Increase in bank's equity was found to have a negative effect on margin when the bank faced little interest rate risk. Angbazo (1997) extended the Ho and Saunders (1981)

modeled to include default risk and its interaction with interest rate risk. He reported that default risk, the opportunity cost of non-interest bearing reserves, leverage and management efficiency are all positively associated with bank interest spread.

Randall (1998) investigated the determinants of interest rate spreads over a six-year period in the Eastern Caribbean and found them to be compared persistently and highly with other low-inflation countries. He concluded that reserve costs, operational costs and provision for loans accounted for over 75% of the observed margin. To examine the impact of financial liberalization of the Colombian economy on interest rate margin, Barajas *et al.* (1999) adopted an approach based on bank profit maximization, which model interest rate spreads as a function of operational costs, financial taxation, market power, and loan quality. Their study concluded that liberalization increased, significantly, the competition among members of the banking industry, lowered market power and reduced financial taxation. Their results also showed that banks appeared to be more responsive to changes in loan quality, which might be an indication of an improvement in banking supervision and/or reporting.

By using a bank level data for 80 countries in the period 1988-1995, Demergüç-Kunt and Huizingha (1999) examined the determinants of bank interest margins and profitability. Their study showed that differences in interest margins and bank profitability reflect several determinants including bank characteristics, macroeconomic conditions, explicit and implicit bank taxation, deposit insurance regulations, financial structure and legal and institutional indicators. Their study reported that a larger ratio of bank assets to GDP and a lower market concentration ratio lead to lower margins and profits. They revealed that foreign banks have higher margins and profits than domestic banks in the developing countries, while the opposite prevail in industrial countries. Particularly in the developing countries, they provide evidence that the corporate tax burden is fully passed to clients.

Bashir (2000) examined the determinants of Islamic banks' profitability and rate of return margin, in which two sets of factors are incorporated into the model, namely internal and external factors. He concluded that higher leverage and large loans-to-asset ratio cause higher bank profits. Ben Naceur and Goaied (2001) examined the determinants of net interest margin within the Tunisian context. Their study revealed that the best performing banks are those who have improvement in their labour and capital productivity, and those who maintain high levels of deposits relative to the assets base.

Abreu and Mendes (2002) reported that well-capitalized banks face lower expected bankruptcy costs, leading to better profitability. Further, they concluded that both of unemployment rates as well as inflation are relevant in explaining profitability. By applying the Ho and Saunders (1981) two-step regression approach, Afanasieff *et al.* (2002) suggested that macroeconomic variables are the most relevant factors to explain bank interest spread in Brazil. Doliente (2003) investigated the bank net interest margin determinants in four Southeast Asian countries. He used the dealer model of Ho and Sounders (1981) in which two-step models are employed. The study indicated that the regions' net interest margins are particularly explained by bank-specific variables. Further, the study revealed that, while net interest margin manifest sensitivity to changes in short-term interest rates, they are still largely explained by non-competitive structure of the regions' banking system.

Ben Naceur and Goaied (2005) examined the impact of banks' characteristics, financial structure and macroeconomic indicators on banks' net interest margins and profitability within the Tunisian banking industry for the 1980-2000 period. They concluded that individual bank characteristics explain a significant part of the within-country variation in bank interest margin and profitability. As well, they found that inflation has a positive impact on banks' net interest margin while economic growth has no effect on banks net interest margin. For financial structure, they concluded that

concentration is less beneficial to the Tunisian banks than competition.

Under the same concern, based on the dealership approach, Al-Abadi (2005) investigated the determinants of bank net interest rate margins under default risk, interest rate risk and market and institutional imperfections. The evidence obtained is consistent with the hypothesis that Jordan bank net interest rate margins are significantly associated with the determining factors. Al-Abadi (2005) study revealed that such relationship is highly relevant to Jordan banks for which an accounting flow, net interest income, is the primary indicator of the effectiveness of bank asset and liability management. For the heterogeneity of the margins determinants across banks, relying on the total average interest earning assets, his study demonstrated that there were significant differences in the margins across different size classes of banks, regardless of the size of their transactions. This is attributed to differences between banks regarding their total average interest earning assets, and their response to deregulation and the increased level of competition in the banking industry.

Estrada *et al.* (2006) analyzed the determinants of interest margins in the Colombian Financial System. Their study employed the Ho and Saunders (1981) modeled, in which interest rate margins are modeled as a function of the pure spread and bank-space institutional imperfections using quarterly data for the period 1994 -2005. Results indicated that the interest margin is determined by operational and other financial costs, which act as substitutes of interest rates for banks and as a complementary for other credit institutions.

METHODOLOGY SPECIFICATION AND DATA DESCRIPTION

Models Employed

This study examines the determinants of bank net interest rate margins within the context of the Jordanian banking industry. To undertake such object, the study follows a functional model which was already employed

earlier by Demerguç-Kunt and Huizingha (1999), Abreu and Mendes (2002), Doliente (2003) and Ben Naceur and Goaied (2005). The study model is tested on time series cross-sectional bank level data in the context of Jordan over the 1992-2005. The empirical specification focuses on the reported net interest rate margin which is assumed to be a function of a set of bank characteristics. To control for the effect of the external factors, targeted macroeconomic variables are included as well.

For testing purposes, panel data analysis is used by employing three alternative models to estimate the parameters of the model.[3] First, the Pooled Least Squares (OLS) model, which basically depends on minimizing the sum of squared residuals and based on the assumption that both intercept and coefficient are constant over time and cross section. Second, the Fixed-Effect Model (least squares with dummy variables, LSDV model) which involves the recognition that the assumption of constant intercept and slope may be unreasonable if the model is estimated using the ordinary least squares pooling procedure. Dummy variables are thus introduced to allow the intercept term to vary over time and over cross-section units. Finally, the Random Effect Model (REM), which is also known as the variance components model, it treats the intercepts as random variables rather than fixed constants. The intercepts are assumed to be independent on the error term and also mutually independent.[4]

In order to provide more insights into the importance of the Bank-Specific characteristics and whether this set of variables makes a significant contribution in explaining the variation in the dependent variable, the study used the diagnostic test (Omitted Variable test) to test for a significant contribution.

The basic model of the study uses the linear form with two main variable categories. The first category represents the bank-specific variables which are to some extent controllable by bank management. The second typifies by the macroeconomic variables, which are taken as given by

banks. Overall, the following linear equation is specified with five bank-specific variables and three macroeconomic factors:

$$NIM_{it} = \alpha_0 + \sum_{k=1}^{5} \alpha_{tk} B_{tk} + \sum_{j=1}^{3} \beta_{tj} X_{tj} + \varepsilon_{it}$$

Where NIM_{it} is the interest rate margin of bank i at time t, defined as interest income minus interest expense divided by total assets. B_{tk} is a vector of bank-specific variables (internal variables); X_{tj} is a vector of macroeconomic variables (external variables); and ε_{it} is the residual term. α_0 represents the model intercept, while α_{tk} and β_{tj} are the coefficients related to the B_{tk} and X_{tj} vectors, respectively.

The Sample and Data of Study

The sample used in this study consists of a panel data set for thirteen commercial banks' over the period 1992 - 2005. Data comprise a representative sample of the banks operating in Jordan, since it represents around 91% of the banking sector in Jordan according to total deposit.[5] Yearly data have been extracted from the consolidated income statements and balance sheets of individual banks. Overall, defining variables are given below.

The justification of choosing this time period is attributed to several factors. Of which, during this period, bank management attempted to improve their performance, while facing several changeable economic conditions i.e., attitude towards deregulation, high inflation, high volatility in interest rates, and the reduction in demand for some exports. Further, during this period, Jordanian banks' spreads and margins had recovered from the effect of deregulation, competitive pressures and increased uncertainty about returns compared with the earlier decade (1980s). Most, if not all, of these factors throughout the reported period had a significant impact on bank spreads and margins causing uncertainty towards the banks' yields. These changes are expected to increase competition and consolidation among the banking sector, which in turn is expected to affect banks' returns accounted by their spreads and margins.

Variables Operational Definition and Data Description
Interest Rate Spread

For measuring interest rate margin, two models are used in the literature, namely, the accounting value of net interest margin and the firm maximization behavior. The accounting model uses the income statement of commercial banks, defining the bank interest rate margin as the difference between the banks' interest income and interest expenses, which is expressed as a percentage of average earning assets. The firm maximization behavior, alternatively, allows derivation of profit maximization rule for interest rate and captures features of market structure. Depending on the market structure and risk management, the banking firm is assumed to maximize either the expected utility of profits or the expected profits. Moreover, depending on the assumed market structure, the interest spread components vary. For example, assuming a competitive deposit rate and market power in the loan market, the interest rate spread is traced using the variations in loan rate. Nevertheless, with market power in both markets, the interest spread is defined as the difference between the lending rate and the deposit rate.

In this study, the accounting value represented by Net Interest Margin (NIM) is used to proxy interest rate spread. It reflects the cost of bank intermediation services and the efficiency of the banking sector.[6] In general, the higher net interest margin, the higher banks' profit and more stable banking sector. However, a higher net interest margin could reflect riskier lending practices associated with substantial loan loss provisions, and, consequently, could be an indication of inefficiency in the banking sector.

Interest income earned by banks include earning on federal funds, repurchase (resale) agreements, interest received on time deposits placed with other banks, and

commercial lending. The relative importance of these income items fluctuates from year to year with shifts in interest rates and loan demand. Mainly, the loan income is nearly always the dominant revenue source for banks, while, on the other hand, interest expenses represent the cost of funds for banks. Costs, in most cases, come from the interest paid on deposits, in addition to the interest owed on short-term borrowing from the money market and borrowings from federal funds, and stopped by security repurchase agreements.

Bank-Specific characteristics (Internal Variables)

Many indicators have been used in the literature to reflect bank-specific characteristics. This study incorporates five indicators that represent the most commonly used variables in the literature. (1) *Operating Costs-to-Total Assets Ratio (OP)*. This ratio is used to capture the operational efficiency of banks, and it is measured by dividing the overhead expense by total assets. The expectation is that increasing spending on the banks' restructuring and more investing in information technology and product quality will keep costs high. But, overall, such factors should eventually contribute to an improvement in operational efficiency and therefore bank performance. Differences in operating costs may also capture differences in business and product mix or even differences in the range and quality of services offered.

The relationship between expenditure and profits may appear to be very straightforward. However, this may not necessarily be so especially if higher expenditure is associated with higher volume of business activity and hence higher revenues as well. Thus, in order to assess a bank's efficiency at expenses management, it would be necessary to deflate the expenditure to reflect variations in activity levels. To this extent and in line with Steinherr and Huveneers (1994), the bank's total expenditure would be deflated by total assets to measure the firm specific expense management efficiency by measuring the cost incurred per monetary unit of assets.[7]

(2) *The Equity-to-Total Assets ratio (CAP)*. In general, this ratio measures the impact of financial leverage. The business of financial intermediation is exposed to various forms of risk such as interest rate risk and credit risk. In this context, the profitability of a bank would be dependent on the management's attitude towards risk. To this extent, the risk inherent in a bank and the management's attitude towards risk can be analyzed by examining the capital and reserves a bank chooses to hold and its liquidity management policies. Banks with high capital–asset ratio would be considered relatively safer in the event of loss or liquidation. Thus, high capital–asset ratios are assumed as an indicator of low leverage and hence low risk, as predicted by the conventional risk-return hypothesis. Thus, a negative relationship between capital ratio and profitability is implied. However, Koehn and Santomero (1980) pointed out that regulation, which increase the capital adequacy requirements, would increase the capital–assets ratio and thus reduce risk. This may induce the banks to absorb greater risk in their asset portfolios in the hope of maximizing the expected returns. Thus, there is also the possibility of a positive association between capital-assets ratio and bank profitability.[8]

(3) *The Loan- to-Total Assets Ratio (LON)*. Bank loans are the main interest-earing assets, and are expected to have a positive impact on bank profitability. This implies that the more loan provided, the higher the interest margin and, hence, the banks' profits. To some extent, a higher loan-to-asset ratio may have a reverse effect on profits. High loan-to-asset ratio may associate with a large number of non-operating loans reflecting a low assets quality. In addition, high ratio raises the financial leverage, and therefore increases risk. In general, this ratio affects positively the net interest margin.

(4) Bank size (*SIZE*). The log of bank size is included in this study to account for cost differences related to bank size, and for the greater ability of large banks to diversify. The cost differences would expect to have positive relationship with net interest margin and therefore

profitability if there are significant economies of scale. However, the ability of diversification would have a negative coefficient when diversification leads to lower risk and thereby lower the required return. Previous studies such as Genay (1999) considered bank size in their profitability model to take into account the possibility of greater loan and product diversification and accessibility of larger banks to capital markets, which are not available for small banks.

(5) *Bank Market Share (MS)*. Market share is measured as the total deposits of bank as a percentage of all banks' total deposits. This ratio may be calculated using total assets or loan. However, since both deposits and loans can be considered as bank output, there is a need to make a choice between a deposit or asset measure of market share. In view of the fact that the asset components may include investment in securities and subsidiaries, which certainly would not be homogenous across firms, the deposit measure of market share is considered a more suitable measure of market share for commercial banks.[9]

According to the relative-market power hypothesis, firms with large market shares are able to exercise market power in setting prices to earn higher net interest margin.[10] Conversely, the efficient-structure hypothesis asserts that a bank that enjoys a superior degree of efficiency can deliver well-differentiated products, and operate at a lower cost. That is, it can follow one of two alternative. First, it can maximize its profits by preserving the current level of prices and firm size. Second, it can maximize its profits by expanding its size through reducing prices. If the second alternative is adopted, the most efficient firms will gain more market share. In both case, it is expected that market share positively affects the net interest margin.

The Macroeconomic Variables (External Variables)

In addition to the internal factors, a bank's margin can also be affected by external factors. For instance, the market for deposits and loans may be affected by an economic slowdown and this would certainly have an impact on margin. As far as banks and other financial intermediaries are concerned, these changing market conditions can be measured from either the asset or the liability side. Three variables included in the study represent the main macroeconomic factors that may have greater effect on bank margins.

(1) *Growth Rate of the Gross Domestic Product (GDP)*. This factor captures the market conditions that certainly have an impact on interest rate spread. During periods of good economic condition, loan demand tends to be higher, allowing banks to provide more loans. Further, the improved economic condition may positively affect bank margin that is because fewer loan defaults normally occur during these periods.

(2) *The CPI Inflation rate (INF)*. This is another important environmental condition which may affect both costs and revenues of most organizations including the banking institutions. This factor represents the changes in the general price level or inflationary conditions in the economy. The impact of inflation rates on bank margin will depend on its effect on bank costs and revenues. Perry (1992) undertook a study on banks gains and losses from inflation, and he asserted that the effect of inflation on bank performance depends on whether the inflation is anticipated or unanticipated. If the inflation is fully anticipated and interest rates are adjusted accordingly resulting in revenues, which increase faster than costs, then it may have a positive impact on margin. However, if the inflation is not anticipated and the banks are lethargic in adjusting their interest rates then there is a possibility that bank costs may increase faster than bank revenues and hence adversely affect bank margin.

(3) *The Exchange Rate (EXCH)*. The exchange rate may have a direct impact on bank margin. Given a favorable movement in exchange rates, the expectation is that the coefficient of this variable will be positive on the interest rate margins.[11]

RESULTS AND DISCUSSION

Table (1) outlines the correlation matrix among the variables. The chief object is measuring the strength or degree of linear relationship between two variables. This matrix helps to account for some econometric problems, especially multicollinearity among independent variables. In general, most variables have low pair-wise correlation coefficients, except the one between the growth rate of GPD and exchange rate, indicating that the multicollinearity problem might not appear among the variables.

Table 1: Correlation Matrix

	NIM	Operating Cost	Equity / Total Assets	Loan / Total Assets	Total Assets	GDP Growth	Inflation	Exchange Rate	Market Share
NIM	1.000								
Operating Cost	0.274	1.000							
Equity / Total Assets	0.121	-0.209	1.000						
Loan / Total assets	0.364	0.484	-0.130	1.000					
Total Assets	0.236	-0.368	-0.101	-0.341	1.000				
GDP Growth	-0.299	-0.169	-0.069	-0.111	-0.108	1.000			
Inflation	-0.075	-0.009	-0.087	0.178	-0.174	0.121	1.000		
Exchange Rate	-0.362	-0.127	-0.151	-0.021	-0.215	0.878	0.273	1.000	
Market Share	0.034	-0.320	-0.098	-0.325	0.814	0.019	-0.017	0.001	1.000

Table (2) reports some descriptive statistics for the variables incorporated in this study. It appears that net interest margin for the Jordanian banks vary form 3.8% to -0.4% with an average of 2 %. Operating cost forms only 3.1% of banks assets on average. The Jordanian banks have an average of 7% of capital ratio. 40% of bank assets are granted as loans. The largest bank in Jordan reaches 40% market share of the total market deposits and the smallest bank has only 4.5% of the market share. The annual average growth rate in GDP is 5.2%, CPI inflation is 2.8%, and exchange rate is USD 1.421 per Jordanian Dinar (JD), the local currency.

Table 2: Descriptive Statistics of Study Variables over the period of 1992-2005

	NIM	Operating Cost	Equity / Total Assets	Loan / Total Assets	Total Assets	GDP Growth	CPI Inflation	Exchange Rate	Market Share
Mean	0.021	0.031	0.072	0.405	19.641	5.189	2.787	1.421	0.075
Median	0.022	0.031	0.080	0.405	19.519	4.200	3.038	1.410	0.040

	NIM	Operating Cost	Equity / Total Assets	Loan / Total Assets	Total Assets	GDP Growth	CPI Inflation	Exchange Rate	Market Share
Maximum	0.038	0.101	0.241	0.619	22.114	18.830	6.501	1.470	0.400
Minimum	-0.004	0.010	-0.427	0.192	17.083	2.100	0.606	1.410	0.003
Std. Dev.	0.009	0.014	0.078	0.099	1.097	4.176	1.601	0.018	0.093
Skewness	-0.387	1.586	-3.048	0.177	0.146	2.709	0.726	1.592	2.225
Kurtosis	2.608	8.187	17.798	2.267	2.701	9.190	3.421	4.680	7.116
Jarque-Bera	4.355	214.1	1483	3.833	1.013	391.9	13.248	75.068	212.7
Probability	0.113	0.000	0.000	0.147	0.603	0.000	0.001	0.000	0.000
Observations	139	139	139	139	139	139	139	139	139
Cross sections	13	13	13	13	13	13	13	13	13

While the null hypothesis H_o under consideration is that the additional set of variables (Bank-Specific characteristics) is not jointly significant, both measures (F-statistic) with a probability of 0.0001 and Log Likelihood Ratio (LR) with a probability of 0.0000 reject the null hypothesis that the series (macro-economic variables) do not belong in the model at a 1%, 5% and 10% level of significance.[12] The significance test of coefficients is based on the t-statistics for all coefficients. For the regression results, Table (3) reports the results of two sets of regression models of the determinants of the net interest margin. The first model includes all bank-specific and macroeconomic variables. The second model drops all insignificant variables and keeps the variables which are significant at 5% level. Overall, the estimation results come as follows;

Table: (3): Regression Estimates of the Targeted Determinants of Banks Net Interest Margins

Independent Variables	Regression (1)			Regression (2)		
	Common Intercept	Fixed Effects	Random Effects	Common Intercept	Fixed Effects	Random Effects
Constant	-0.014 (-0.128)		0.149 (1.006)	-0.128 (-7.305)***		-0.123 (-5.262)***
bank-specific characteristics (Internal Variables)						
Overhead/Total Assets (OP)	0.180 (3.652)***	0.069 (1.764***)	0.008 (0.185)	0.198 (4.196)***	0.102 (2.077)**	0.120 (2.610)**

Independent Variables	Regression (1)			Regression (2)		
	Common Intercept	Fixed Effects	Random Effects	Common Intercept	Fixed Effects	Random Effects
Equity/Total Assets (CAP)	0.029 (2.739)***	0.051 (4.666)***	0.037 (3.847)***	0.032 (4.324)***	0.057 (5.179)***	0.049 (5.122)***
Loans/Total Assets (LON)	0.034 (5.168)***	0.018 (2.263)**	0.027 (3.595)***	0.035 (5.408)***	0.025 (3.211)***	0.030 (4.198)***
Total Assets (Log) (SIZE)	0.005 (5.747)***	0.001 (0.411)	0.001 (0.873)***	0.006 (7.377)***	0.006 (4.445)***	0.006 (5.403)***
Market Share(MS)	-0.030 (-2.765)***	-0.058 (-1.445)	-0.010 (-0.388)	-0.035 (-3.449)***	-0.086 (-2.164)**	-0.045 (-2.440)**
Macroeconomic Factors (External Variables)						
GDP Growth Rate (GDP)	0.005 (0.192)	0.004 (.0175)	0.001 (0.029)			
CPI Inflation (INF)	0.023 (0.609)	0.008 (0.271)	0.006 (0.183)			
Exchange Rate(EX)	-0.071 (-0.942)	-0.138 (-1.566)	-0.126 (-1.523)			
R-Squared	0.46	0.74	0.76	0.45	0.71	0.68
Adjusted R-Squared	0.43	0.69	0.74	0.43	0.67	0.67
F	10.7723	58.5281		16.8041		
P-value	0.0000	0.0000		0.0000		
Observations	139	139	117	139	139	139
Number of Banks	13	13	13	13	13	13

Note: numbers in parentheses are t-statistics. "***", "**" and "*" indicate that the coefficients are significant at 1%, 5%, and 10%, respectively.

The Bank-Specific Characteristics (Internal Variables)

For the operation cost variable (OP), considering the two sets of regression models, it seems that the proxy of the OP is significant and positive in its relationship with the banks' net interest margin within the Jordanian context. Therefore, the overall result shows that the relationship between overhead-to-assets ratio and net interest margin is significantly positive. The result implies that the Jordanian commercial banks would have the chance to pass over overhead costs to their clients by charging higher interest rates on loans or pay lower interest rates on deposits. It seems that smaller banks are less efficient under higher operating costs, reflecting lower capability of passing overhead costs to clients.[13]

In respect to the model specifications, the CAP proxy (under all specifications used) also shows a significant and positive impact in its relationship with the banks' net interest margin. Such conclusion is in line with previous evidences i.e., Berger (1995) and Dermerguç-Kunt and Huizingua (1999). In this regard, Buser *et al.* (1981) argued that banks generally have an optimal capitalization ratio and need to remain well capitalized when they have a high franchise value. In general, the finding indicates that well-capitalized banks in the Jordanian banking industry support

lower expected bankruptcy costs for themselves and their clients, which reduce their cost of capital.

The loan-to-assets ratio (LON) has the expected impact on net interest margin, since the coefficient of this ratio is positive and highly significant across all specifications, reflecting more care monitoring acts made by banks toward their lending process. Under this conclusion there is a chance that banks seek growth by relaxing credit selection and monitoring. However, banks seem to be able to maintain low levels of non-performing loans, thereby increasing profits and margins. This finding implies also that gaining more loans (increasing market share) would likely to increase the interest margin.

While the coefficient of the SIZ proxy is only significant under the common OLS regression model with t-statistics value of $(5.747)^{***}$, the FEM shows that the size factor has a limited effect on the interest rate margin model, while the REM shows that the relationship is positive and highly significant. This finding suggests that larger banks tend to gain higher margins, that is, the Jordanian banks are operating at significant scale of economies, (Balloul, 2004). Overall, the size proxy result confirms that little cost saving can be achieved by increasing the size of the banking firm (Berger *et al*.,1987). Yet, significant scale of economies can be reported for banks whose asset size extends well into wide range, (Shaffer, 1985).

For the market share proxy (MS), referring to the market-power hypothesis, the impact of market share is expected to be positive in its impact on banks' net interest margin. The argument is that banks with large market share have the market power to affect prices. Generally, regression results of Table (2) show that the coefficients of marker share (-2.765)*** are negative and significant. The same result is found by Balloul (2004) who asserted that this result is quite surprising, and suggested that the Jordanian banks with large market shares do not exercise relative market power by changing deposit and loan rates and therefore gain high profits or net interest margin. However, Balloul (2004, p.74)

stated that "if it is considered that MS captures product differentiation as well as market power, then it appears that Jordanian banks do not differentiate traditional loan and deposit products (i.e., do not exert market power in these markets), but rather less 'conventional' bank products and services. It also means that market structure is not relevant in those traditional activities; however, they do exert market power in some other bank products and services such as off-balance activity".

Macroeconomic Factors (External Variables)

The regression estimates reported in Table (3) show that macroeconomic developments have no significant effect on the Jordanian banks' net interest margins. In which, the coefficients of the three macroeconomic factors (growth rate in GDP, CPI inflation and exchange rate) are insignificant. However, growth rate has a positive impact on banks' net interest margins, indicating that movements to deregulation together with technology advances would lead to improvements in the overall banking businesses, causing higher spreads, and hence, higher net interest margins. The inflation rate have a positive impact, suggesting that banks tend to profit from inflationary environment by charging higher loan interest rates, and therefore, higher net interest margins. Finally, the nominal effective exchange rate does not have any impact on net interest margin.

To test for the effect of the break structure in the loan and deposit interest rates in 1998, regression 2 of Table (3) is retested by adding the five dummy variables.[14] The first one is incorporated to test for the break point in 1998. The others are used to control for structural change in the determinants of net interest margin that may have occurred as a result of decline in the lending and deposit rates starting in 1998. Table (4) shows that the break structure in the lending and deposit rates have no impact on the net interest margin. Moreover, only structural change in the capital ratio can be considered with positive effect, since the other ratios are statistically insignificant.

Table (4): The Determinants of Banks' Net Interest Margin with the Dummy Variables

Independent Variables	Regression (1)		
	Common Intercept	Fixed Effects	Random Effects
Constant	-0.127 (-5.733)***		-0.127 (-3.975)***
Bank-Specific Characteristics			
1- Overhead/Total Assets (OP)	0.149 (1.690)*	0.121 (1.349)	0.126 (2.280)**
2- Equity/Total Assets (CAP)	0.025 (2.511)**	0.060 (4.011)***	0.052 (5.110)***
3- Loans/Total Assets (LON)	0.041 (3.254)***	0.029 (2.785)***	0.033 (3.818)***
4- Total Assets (Log) (SIZE)	0.006 (5.344)***	0.006 (2.336)**	0.006 (3.883)***
5- Market Share (MS)	-0.034 (-3.238)***	-0.057 (-1.492)	-0.042 (-1.850)*
Dummy & Internal Variables			
Dummy Indicator	0.001 (0.307)	-0.001 (-0.369)	-0.001 (-0.385)
Structural Change Indicator			
1- Overhead/Total Assets (with Dummy)	0.089 (0.863)	0.002 (0.035)	0.007 (0.103)
2- Equity/Total Assets (with Dummy)	0.024 (1.687)*	0.057 (4.176)***	0.054 (3.839)***
3- Loans/Total Assets (with Dummy)	-0.013 (-0.949)	-0.008 (-0.724)	-0.008 (-0.709)
R-Squared	0.47	0.75	0.72
Adjusted R-Squared	0.43	0.70	0.70
Observations	139	139	139
Number of Banks	13	13	13

Note: numbers in parentheses are t-statistics. "***", "**" and "*" indicate that the coefficients are significant at 1%, 5%, and 10%, respectively.

See p.10 and p.23 for the justification of using the dummy variables

SUMMARY AND CONCLUSIONS

The earlier discussion places an emphasis on the fact that a profitable banking sector is of major concern to policy makers in banking industry in order to enhance their banks survival, and to government owing to its role in the stability of financial system and therefore the economy. This study examines the impact of two factors, namely bank-specific and macroeconomic variables, on bank's net interest margins within the context of the Jordanian banking industry for the periods (1992-2005). The findings suggest that: bank-specific characteristics (internal variables) explain a substantial part of the within-country variation in bank interest margins. High net interest margin tend to be associated with banks that hold a relatively high amount of capital, which indicates that well-capitalized banks support lower financial leverage and expected bankruptcy costs for themselves and their costumers, which reduce their cost of capital.

Jordanian banks are operationally inefficient (with higher operating costs), since less efficient bank charges higher interest rates on loans (or pay lower rates on deposits).

Furthermore, the finding implies also that gaining more loans (increasing market share) would be likely to increase interest margin. The significance of the size factor suggests that the Jordanian banks are operating at a significant scale of economies. Finally, the negative effect of market share on the net interest margin implies that banks with large market shares do not exercise relative market power by changing deposit and loan rates and therefore gain high profits or net interest margin. In addition to bank-specific characteristics, macroeconomic indicators, such as inflation, growth rate in GDP and exchange rate have no impact on bank's interest margins. This finding may suggest that Jordanian banks work out of macroeconomic conditions.[15]

NOTES

1   The bank interest spread is defined as the difference between the yield on average interest earning assets and the cost of interest bearing liabilities. The margin, commonly known as the net interest margin, is defined as the difference between interest revenue and interest expenses expressed as percentage of average interest earning assets.

2   This model has been used by earlier studies. See for example Abreu and Mendes (2002) and Doliente (2003).

3   It is important to note that having panel data has many advantages; mainly it allows testing and relaxing the assumptions that are implicit in cross-sectional analysis. In particular, the fixed and random effect models allow for heterogeneity due to unobservable factors across banks.

4   The OLS results are presented for comparison purposes. Basically, comments and discussions are made based on the Fixed and Random Effect Models. However, given the limited number of banks in Jordan, especial emphasis has been given to the Fixed Effect Model (FEM).

5   Banks under consideration of this study include; Arab Bank plc (Jordan Branches), The Housing Bank for Trade and Finance, Bank of Jordan, Arab Banking Corporation (Jordan), Jordan Kuwait Bank, Jordan National Bank, Union Bank for Saving and Investment, Cairo Amman Bank, Jordan Investment and Finance Bank, Arab Jordan Investment Bank, Middle East Investment Bank, Jordan & Gulf Bank, Philadelphia Bank for investment.

6   In fact, the efficiency of bank intermediation can be measured by both ex-ante and ex-post spreads. Ex-ante spreads are calculated from the contractual rates charged on loans and rates paid on deposits. Ex-post spreads consist of the difference between banks' actual interest revenues and their actual interest expenses. The ex-post measure of the spread generally differs from the ex-ante measure because of loan defaults. The ex-post spread is more useful, as it controls for the fact that banks with high-yield, risky credits are likely to face more defaults. An additional problem with using ex-ante spread measures is that data are generally available at the aggregate industry level, are put together from a variety of different sources, and thus are not completely consistent. For these reasons, we focus on ex-post interest spreads in this study.

7   See Randal (1998) and Barajas et al. (1999).

8   See Koehn and Santomero (1980) and Yu (1995).

9   See McShane and Sharp (1985).

10   This hypothesis asserts that firms with large market shares and well-differentiated products are able to exercise market power in setting prices to earn supernormal profits.

11   Exchange rate is the price of one currency in relation to another. For the impact of market size and concentration to control the effect of external factors, see Ben Naceur and Goaied (2005), p.3.

12   The detection of non-presence of multicollinearity that might cause troublesome or statistical problems is confirmed by using the Variance Inflationary Factor (VIF), the reciprocal of the tolerance, for each explanatory variable.

13   Such results are suppotred by McShane and Sharpe (1985) and Wong (1997)

14   The structural change by the year 1998 is attributed to several motivations. Under this concern, by the year 1997, as reported by Al-Abadi (2003, p.20), "the Central Bank of Jordan (CBJ) was very much interested in enhancing the overall soundness of the banking system and activating the inter-bank market. In this regard, the CBJ raised the minimum capital adequacy ratio from 10% to 12% effective June 1997 financial statements. Further, the CBJ permitted trading of certificates of deposit in the inter-bank secondary market. By the year 1998, the CBJ focused on addressing the sharp demand for foreign currencies, and developing the money market (inter-bank market). During the period 1998 to 2001, the CBJ adopted a number of measures and legislative reforms. For example, in the field of banking legislation, during 1998, the CBJ finalized a new draft Banking Law and a draft law for the establishment of a deposit insurance corporation. In preparing the two new draft laws, the CBJ took care to keep abreast with the new developments prevailing on the international banking arena".

15   Under this result, it is highly recommended to undertake further studies to test for the impact of the monetary policy undertaken by the Central Bank of Jordan and its impact on banks overall performance, particularly the impact made on banks net interest margins. The nature of the impact of GDP (low impact) on banks performance, may be attributed to other more related bank requirements i.e., Bazel II requirements directed the capital dequacy of banks which is needed to be tested in separate studies.

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