

# **Determinants of Bank Profitability: Evidence from Syria**

**Mohamed Khaled Al-Jafari<sup>1</sup> and Mohammad Alchami<sup>2</sup>**

## **Abstract**

This study investigates the determinants of bank profitability in the Syrian banking sector. It seeks to identify significant bank-specific, industry-specific, and macroeconomic determinants of bank profitability in Syria. We utilize the Generalized Method of Moments (GMM) technique on unbalanced panel data set the covers the period from 2004 until 2011. The empirical results reveal that profitability persists to a moderate extent. All bank-specific determinants (liquidity risk, credit risk, bank size, and management efficiency) with the exception of bank capital, affect bank profitability significantly. However, no evidence was found in support of the Structure Conduct Performance (SCP) hypothesis, since the concentration ratio found to have no impact on bank profitability. Finally, the study shows that macroeconomic variables (inflation rate and real gross domestic product growth rate) affect bank profitability significantly.

**JEL classification numbers:** C33, E44, G21

**Keywords:** Bank Profitability, Return on Average Assets, Return on Average Equity, Panel Data, GMM Technique, Structure Conduct Performance Hypothesis, Syria.

## **1 Introduction**

The importance of bank profitability can be appraised at the micro and the macro levels of the economy. At the micro level, profit is the essential prerequisite of a competitive banking institution and the cheapest source of funds. It is not merely a result, but also a necessity for successful banking in a period of growing competition on financial markets. Hence, the basic aim of a bank management is achieving a profit, as the essential requirement for conducting any business (Bobakova, 2003). In addition, at the macro level, a sound and profitable banking sector is better to withstand negative shocks and contribute to the

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<sup>1</sup>The Arab Academy for Banking and Financial Sciences. Banking and Finance Department. Dean of Postgraduate Studies.

<sup>2</sup>The Arab Academy for Banking and Financial Sciences. Banking and Finance Department.

stability of the financial system. The importance of bank profitability at both the micro and the macro level has made researchers, academics, bank managements, and bank regulatory authorities, interested in factors that affect bank profitability (Athanasoglou, Brissimis & Delis, 2005).

Previous studies (Short, 1979; Bourke, 1989; Molyneux & Thornton, 1992; and Demirguc-Kunt & Huizinga, 2000) on banks profitability are usually expressed as a function of internal and external determinants. The internal determinants refer to the factors that are originated from banks accounts (balance sheet and/or profit and loss accounts) and therefore, they could be termed as micro or bank-specific determinants of profitability. The external determinants are variables that are not related to the bank management. They reflect the economic and the legal environment that affect the operation and performance of financial institutions.

During the last two decades, the banking sector has experienced a worldwide major transformation in its operating environment. In the Syrian Arab Republic, after 40 years of absence, the role of Central Bank of Syria (CBS) in the economy has been revived by issuing the Basic Monetary Law No.23 for the year 2002, which was considered as a key turning point in the history of monetary policy in Syria. Besides its role in reactivating the Money and Credit Board, the highest monetary authority in Syria, Law No.23 has taken the first step toward CBS autonomy.

Thus, a great importance has been accorded to the reform of laws, decisions, and other legislations regulating the banking and financial activities. This will enhance the ability of financial institutions to access the Syrian market and enable them to carry out and diversify their activities within the regulations governing their activities as well as carrying them out in accordance with the objectives determined by the monetary authorities and international standards. In this sense, the reform process of existing laws, legislations and decisions in the monetary and financial field continued, and more of them were issued during the year 2009, of which the most important are: First, reinforcement of the banking and the financial sector; second, activating the role of the Central Bank of Syria in managing the monetary policy; third, organizing the work of the banking system; fourth, organizing the work of public banks; fifth, organizing the work of private classical banks; sixth, organizing the work of Islamic banks; seventh, organizing the work of exchange offices and companies; eighth, organizing the work of micro-finance institutions.<sup>3</sup>

Therefore, this study concentrates on investigating the variables that affect bank profitability. These variables are categorized into three groups, bank-specific, industry-specific, and macroeconomic determinants. Researches that studied internal determinants had employed variables such as capital size, bank size, liquidity risk, credit risk, and management efficiency etc. Turning to the external determinants, several factors have been suggested as influencing profitability and these factors could be distinguished into control variables that describe the macroeconomic environment, such as inflation, and real gross domestic product growth rate (GDP); next to variables that represent market characteristics such as market concentration and ownership structure.

Because the bank's management differs from others in its policies for managing and controlling the risks and targets associated with its operations, the profitability of each

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<sup>3</sup>Central Bank of Syria. Quarterly Statistical Bulletin (2010), 48, 3-4.

bank will also be varied. Therefore, the profitability of banks in Syria will differ according to the factors that affect the risks and returns of these banks. Consequently, this study will answer the following three questions:

Why there are differences in profitability in the Syrian banking sector?

What are the most important variables that affect banks profitability significantly?

Do these variables affect bank profitability positively or negatively?

In principle, there are three motivations for this study. First, the CBS, though currently concerned about enhancing and maintaining stability of banks in Syria, has not mapped out econometrically determined targets and guidelines toward achieving this effort. It has also never rendered econometrically determined answers to the following questions: Why are some banks in Syria more successful than others? To what extent discrepancies in these banks' profitability are due to variations in exogenous factors not directly under the control of bank management. Therefore, this study has important implications, as it will help bank regulatory authorities in Syria to determine future policies and regulations to be formulated and implemented toward improving and sustaining banking sector profitability and stability. Although similar studies have been conducted on different countries such as Greece (Athanasoglou et al., 2005), the United States of America (Berger, Hanweck & Humphrey, 1987; and Berger, 1995b), and Jordan (Ramadan, Kilani & Kaddumi, 2011), there is no such an empirical study that has been conducted on Syrian banks. Therefore, this study fills an important gap in the existing literature and improves the understanding of bank profitability in Syria. Finally, the outcome of this study will be useful to the shareholders and managements of banks in Syria who are interested in making effective decisions that will help boosting the profitability of their respective banks.

The banking sector represents the backbone of the Syrian economy and plays an important financial intermediary role. Therefore, its health is considered very critical to the health of the general economy at large. Given the relationship between the well-being of the banking sector and the growth of the economy (Levine, 1998), knowledge of the underlying factors that influence the financial sector's profitability is therefore essential not only for managers of banks, but also for numerous stakeholders, such as the central banks, bankers associations, governments, and other financial authorities institutions. Knowledge of these factors would also be beneficial in helping the regulatory authorities and banks' managers formulate going-forward policies for improved profitability of the Syrian banking sector.

This paper is organized into six sections as follows: Section 2 addresses the previous studies, while section 3 presents the hypotheses. Data and research methodology are detailed in section 4. On the other hand, the empirical findings, and hypotheses testing are illustrated in section 5. Finally, section 6 provides the concluding remarks of the study.

## **2 Literature Review**

This section provides a comprehensive review of the previous studies that have shed the light on the determinants of bank profitability. It addresses studies that have examined macroeconomic variables, followed by studies that have investigated industry-specific variables; and finally, studies that have tested bank-specific variables.

The first set of the literature investigated the macroeconomic control variables such as inflation rate, and real GDP growth rate. For instance, Revell (1979) introduces the issue

of the relationship between bank profitability and inflation. He finds that the effect of inflation on bank profitability depends on whether wages and other operating expenses increase at a faster rate than inflation. On the other hand, Perry (1992) states that the extent to which inflation affects bank profitability depends on whether inflation expectations are fully anticipated. An inflation rate fully anticipated by banks management implies that banks can appropriately adjust interest rates in order to increase their revenues faster than their costs, thus, acquiring higher economic profits. In addition, Bourke (1989) has shown a positive relationship between inflation rate and profitability. Similarly, by replicating Bourke's methodology and examining the determinants of bank performances across eighteen European countries between 1986 and 1989, Molyneux and Thornton (1992) have also shown a positive relationship between inflation rate and profitability. However, Demirguc-Kunt and Huizinga (1999) conclude that banks in developing countries tend to be less profitable in inflationary environments, particularly when they have a high capital ratio. In these countries, bank costs actually increase faster than bank revenues. On the other hand, Demirguc-Kunt and Huizinga (2000) find that inflation is significant and positive. This suggests that banks tend to profit in inflationary environments. Although the studies of Guru, Staunton, and Balashanmugam (2002) on Malaysia and Jiang, Tang, Law, and Sze (2003) on Hong Kong show that higher inflation rate leads to higher bank profitability. On the other hand, the study of Abreu and Mendes (2000) reports a negative coefficient for the inflation variable in European countries. In addition, Afanasieff, Lhacer, and Nakane (2002) use panel data techniques to uncover the main determinants of bank performance in Brazil. They find that macroeconomic variables such as inflation expectations is important in determining bank profitability. In contrast, Ben Naceur (2003) finds no effect for the inflation on bank profitability. On the other hand, Vong and Chan (2006) examined the impact of bank characteristics, macroeconomic variables and financial structure on the performance of the banking industry of Macau. The results show that with regard to macroeconomic variables, only the rate of inflation showed a great relationship with the performance of banks. Another study conducted by Pasiouras and Kosmidou (2007) examines a variety of bank profitability determinants using data covering the period 1995-2001 for 15 European countries. They use the return on average assets (ROAA) as the dependent variable and they separately run regressions for domestic and foreign banks. They find that there is a negative relationship between bank profitability and inflation for foreign banks but a small positive relationship for domestic banks. They suggest that domestic banks adjust interest rates to anticipated levels of inflation whereas foreign banks may not. Similarly, Li (2007) investigates the impact of banks specific factors and macroeconomic factors on the banks profitability in the UK. The results show that the macroeconomic variables such as inflation, has insignificant impact on performance. On the other hand, Alexiou and Sofoklis (2009) find that the inflation rate appears to have a positive but slight effect on bank profitability. This could be ascribed to the ability of management to adequately, though not fully, forecast future inflation, which in turn implies an appropriate adjustment of interest rates to achieve higher profits (Athanasoglou et al., 2005). Similarly, Sufian (2011) reports that business cycle effects, particularly inflation, display a substantial pro-cyclical impact on Korean banks' profitability. In addition, Ramadan et al., (2011) investigate the nature of the relationship between the profitability of the Jordanian banks and the characteristics of internal and external factors. Their results show that inflation has a positive insignificant impact on ROA and ROE. This may suggest that, due to the

inability of banks to accurately predict the levels of inflation, the banks lose the opportunity to benefit from inflationary environment to increase profits.

Moving into the GDP growth rate, Neely and Wheelock (1997) find a positive impact of the economic growth rate on bank profitability. Also, Demirgüç-Kunt and Huizinga (1999), and Bikker and Hu (2002) find a positive correlation between bank profitability and the business cycle. Similarly, Afanasieff et al., (2002) find that macroeconomic variables such as GDP growth rate, is important in determining bank profitability over time. In contrast, Ben Naceur (2003) finds no impact for the economic growth on banks profitability. However, Williams (2003) finds that profits are a negative function of home GDP growth.

By employing a direct measure of the business cycle, Athanasoglou, et al., (2005) find a positive, albeit asymmetric, effect on bank profitability in the Greek banking industry, with the cyclical output being significant only in the upper phase of the cycle. In addition, the rate of GDP growth reflects the state of the economic cycle and is expected to have an impact on the demand for banks loans. The positive impact of GDP supports the argument of the positive association between growth and financial sector performance (Kosmidou, Tanna & Pasiouras, 2006). According to Al-Haschimi (2007), the macroeconomic environment has only limited effect on net interest margins in the Sub-Saharan African countries. Nonetheless, Pasiouras and Kosmidou (2007) find that the coefficient of GDP growth is confusing, in the foreign sample; GDP growth is negatively related to the profitability but in the domestic sample; GDP growth is positively related. On the other hand, GDP growth is positively significant in the total sample but has a very small coefficient. On the other hand, Li (2007) finds that GDP growth rate has insignificant impact on the performance of banks. Similarly, Alexiou and Sofoklis (2009) find that the GDP variable is highly insignificant. On the contrary, Sufian and Habibullah (2009) investigate the determinants of the profitability of the Chinese banking sector during the post-reform period of 2000-2005. They find that the impact of the economic growth on profitability is positive. Similar findings were obtained by Athanasoglou et al., (2008), and Dietrich and Wanzenried (2010) where their results show a positive impact of economic growth on banks profitability. Moreover, Ben Naceur and Kandil (2009) find that the reduction in economic activity had opposite effects on Egyptian banks' profitability. Another study conducted by Ommeren (2011) examines the determinants of banks profitability for the European banking sector. The findings reveal that the effect of growth of GDP is significantly positive on bank profitability, and the parameter is significant in both the pre-crisis period as in the crisis period and in the total sample. Similar to Li (2007), the results of Ramadan et al., (2011) show that the banks have not benefited from economic growth and additional business opportunities to increase profitability. One reason for this may be the entry of new banks to the industry, which led to more intense competition. Contrary results were observed by Curak, Poposki, and Pepur (2012), where they find that the economic growth shows significant effect on bank profitability in Macedonia.

The second set of the literature examined the industry variables. A completely new trend about structural effects on bank profitability started with the application of the market-power (MP) and the efficient-structure (ES) hypotheses. The MP hypothesis, which is sometimes also referred to as the structure-conduct-performance (SCP) hypothesis, asserts that increased market power yields monopoly profits. A special case of the MP hypothesis is the relative-market-power (RMP) hypothesis, which suggests that only firms with large market power shares and well-diversified products are able to

exercise market power and earn non-competitive profits. Likewise, the X-efficiency version of the ES (ESX) hypothesis suggests that increased managerial, and scale efficiency could lead to higher concentration and hence, higher profits. Studies such as those by Smirlock (1985) and Berger (1995a) investigated the profit-structure relationship in banking, providing tests of the aforementioned two hypotheses. To some extent the RMP hypothesis is verified, since there is evidence that superior management and increased market share (especially in the case of small to medium size banks) raise profits. In contrast, weak evidence is found for the ESX hypothesis. Managerial efficiency can lead to market share gains, as well as managerial efficiency raising profits, and therefore increased concentration, so that a positive relationship between concentration and profit maybe a spurious result due to correlations with other variables (Berger, 1995a). Therefore, controlling for other factors, the role of concentration should be negligible.

Molyneux and Thornton (1992) repeat previous studies of Short (1979) and Bourke (1989). They find that there is a significant relationship between net profit and concentration. On the other hand, Eichengreen and Gibson (2001) suggest that the Greek banking sector is imperfectly competitive. In addition, Market-specific variables such as concentration ratios and market shares were found to have a positive but insignificant effect on alternative measures of profitability. Similarly, Kosmidou et al., (2006) report that the positive impact of concentration supports the Structure-Conduct Performance (SCP) hypothesis and reflects the oligopolistic structure of the UK banking market. Also, Demircuc-Kunt and Huizinga (1999) and Hassan and Bashir (2003) find this positive association in a multi-country context. Furthermore, Park and Weber (2006) identify the major determinants of profitability in the Korean banking sector for the period of 1992-2002 by testing the market structure hypothesis against the efficient structure hypothesis. Their results indicate that bank efficiency has a significant effect on bank profitability and support the efficient structure hypothesis.

In addition, Pasiouras and Kosmidou (2007) examine the relationship between bank profitability and financial structure variables such as the concentration ratio. They find that concentration is insignificant in explaining profitability for domestic banks but significant for foreign banks. In contrast to Hassan and Bashir (2003), Garcia-Herrero, Gavila, and Santabarbara (2009) find that a less concentrated banking system increases bank profitability, which reflects that the four state-owned commercial banks, China largest banks, have been the main drag for profitability. On the other hand, Sufian (2011) shows that the industry concentration of the national Korean banking system can positively and significantly affects bank performance. While the results of Ramadan et al., (2011) show that concentration has a negative effect on profitability. They suggested that in a high concentration markets, banks profitability tend to be lower due to aggressive non-price competition and that the behavior of managers is risk-averse. Similarly, Curak et al., (2012) find that concentration shows significant effect on bank profitability in the Republic of Macedonia. In addition, Mirzaei, Moore, and Liu (2013) incorporate the traditional structure-conduct-performance (SCP) and relative-market-power (RMP) hypotheses in investigating the effect of market structure on profitability and stability for 1929 banks in 40 emerging and advanced economies over the period of 1999-2008. They observe that greater market share leads to higher bank profitability, being biased toward the RMP hypothesis in advanced economies. Yet, neither of the hypotheses is supported for profitability in emerging economies.

The third set of the literature tested the bank-specific variables. Studies dealing with

internal determinants employ variables such as bank capital, liquidity risk, credit risk, bank size, and management efficiency.

Berger et al., (1987) find positive causation in both directions between capital and profitability. In addition, Bourke (1989) finds an important positive relation between capital adequacy and profitability. He illustrates that the higher the capital ratio, the more the bank will be profitable. Similarly, Molyneux and Thornton (1992) find that there is a significant relationship between capital ratio and net profit. On the other hand, Berger (1995b) finds that the book value of equity-to-asset ratio is positively related to ROE, in both the cross-sectional and the time-series samples. In addition, Demircug-Kunt and Huizinga (1999) utilize a sample of 80 developed and developing countries. They conclude that the overall results show evidence of a positive relationship between the capital ratio and financial performance.

Another study by Abreu and Mendes (2002) was conducted on commercial banks from four different European Union (EU) countries. The empirical findings reveal that well-capitalized banks have low bankruptcy costs and higher interest margin on assets. On the other hand, Ben Naceur (2003) concludes that, in Tunisian Banks, high net interest margin and profitability are likely to be associated with banks with high amount of capital and large overheads. As for the Greek banking industry, Athanasoglou, Delis, and Staikouras (2006b) reveal that capital (equity-to-asset ratio) is very important in explaining bank profitability. Similarly, Vong and Chan (2006) investigate the impact of internal and external factors of banks in Macau. Their results indicate that with greater capitalization, there is a low risk and a high profitability for the banks. Similarly, Kosmidou et al., (2006) find that the strength of capital of UK banks has a positive impact on profitability for these banks. In addition, the results of the study by Li (2007) shows that capital strength was one of the main determinants of UK banks performance. This finding is consistent with previous studies (e.g. Berger, 1995b; Demircug-Kunt & Huizinga, 1999; Ben Nacuer, 2003; and Kosmidou & Pasiouras, 2005) providing support to the argument that well capitalized banks face lower costs of going bankrupt, which reduces their cost of funding or that they have lower needs for external funding which results in higher profitability (Li, 2007). Pasiouras and Kosmidou (2007) have reached the same results. They find a positive relationship between capital (equity-to-asset ratio) and profitability. Moreover, the coefficient of capital size has the most explanatory power for profitability in the model of the domestic banks. They report that well-capitalized banks face lower funding costs because of reduced bankruptcy costs and the less need for external funding.

In addition, Ben Naceur and Goaid (2008) suggest that Tunisian banks, which hold relatively high amount of capital and higher overhead expenses, tend to exhibit higher net-interest margin and profitability level. Furthermore, Ben Naceur and Omran (2008) analyze the influence of bank regulations, concentration, financial and institutional development on the Middle East and North Africa (MENA) countries. They find that bank-specific characteristics, in particular bank capitalization has a positive and significant impact on banks net-interest margins, cost efficiency, and profitability. Similarly, Sufian and Habibullah (2009) find that capitalization has a positive impact on the profitability of the state-owned commercial banks. In addition, Garcia-Herrero et al., (2009) report that better capitalized banks tend to be more profitable. As for the Egyptian banking sector, Ben Naceur and Kandil (2009) investigate the effects of capital regulations on the cost of intermediation and profitability. They find that higher capital requirements is one of the factors that contributed positively to bank profitability in the

post-regulation period. Similarly, Dietrich and Wanzenried (2011) investigate the profitability of 372 commercial banks in Switzerland. They find that the coefficient of capital size is insignificant before the financial crisis but it turns out to be negatively significant in the crisis period, and in the total sample. These results are in contrary to the outcomes of the positive relationship found in some previous studies. Ommeren (2011) examines additional determinants of banks profitability for the European banking sector. He suggests that the equity-to-asset ratio is positively related to banks profitability.

On the other hand, Ramadan et al., (2011) find that high Jordanian banks' profitability tends to be associated with well-capitalized banks. In addition, Lee and Hsieh (2013) utilize the GMM technique for dynamic panels using bank-level data for 42 Asian countries over the period 1994 to 2008 to investigate the impacts of bank capital on profitability and risk. They report that, firstly, along with the change in the categories of banks, investment banks have the lowest and positive capital effect on profitability, whereas commercial banks reveal the highest reverse capital effect on risk. Secondly, banks in low-income countries have a higher capital effect on profitability; banks in lower-middle income countries have the highest reverse capital effect on risk, while banks in high-income countries have the lowest values. Thirdly, banks in Middle Eastern countries own the highest and positive capital effect on profitability. Far East and Central Asian banks have the largest reverse capital effect on risk, while the lowest values occur in Middle Eastern banks. On the other hand, Berger and Bouwman (2013) empirically examine how capital affects bank performance (survival and market share) and how this effect varies across banking crises, market crises, and normal times that occurred in the USA over the past twenty-five years. They find that capital enhances the performance of medium and large banks primarily during banking crises, while it helps small banks to increase their probability of survival and market share at all times (during banking crises, market crises, and normal times).

The need for risk management in the banking sector is inherent in the nature of the banking business. Poor asset quality and low level of liquidity are the two major causes of bank failures. During periods of increased uncertainty, financial institutions may decide to diversify their portfolios and/or raise their liquid holdings in order to reduce their risk. In this respect, risk can be divided into liquidity and credit risk (Li, 2007). Based on previous literatures, results related to liquidity are mixed. Molyneux and Thornton (1992), among others, find a negative and significant relationship between the level of liquidity and profitability. Similarly, Guru, Staunton, and Balashanmugam (1999) find a negative relationship between liquidity and bank profitability.

In contrast, Bourke (1989), and Kosmidou and Pasiouras (2005) conclude an opposite results. In addition, the liquidity ratio proxied by loans to customers and short-term funding, is positively related to profitability in the foreign banks sample, and negatively related in the domestic banks sample (Pasiouras & Kosmidou, 2007). Thus, the conclusion about the impact of liquidity on bank performance remains ambiguous and further research is needed. Similar to Pasiouras and Kosmidou (2007), Li finds that liquidity impact on bank profitability is mixed and not significant, indicating that conclusion about the impact of liquidity remains questionable and further investigation is required (Li, 2007). On the other hand, Alexiou and Sofoklis (2009) find that with respect to bank liquidity, as measured by the ratio of loans over deposits, the relationship with profitability is negative and significant. The estimated coefficient corresponding to this particular proxy suggests that an increase in liquidity will cause a decline in profitability. These findings highlight the trade-off between liquidity and profitability. On the other



hand, Sufian and Habibullah (2009) find liquidity has a positive impact on the state-owned commercial bank profitability. In addition, Sufian (2011) documented that Korean banks with lower liquidity levels tend to exhibit a higher profitability. Moreover, Ommeren (2011) finds little support that the variable of customer deposits to total funding and the variable of liquid assets to short-term funding (excluding derivatives) are determinants for banks profitability. Both proxies appear to be insignificant in all periods suggesting that future funding and liquidity requirements do not influence profitability. Furthermore, Curak et al., (2012) find that profitability is influenced by liquidity risk in the Republic of Macedonia.

Heffernan (1996) defined credit risk as the risk that an asset or a loan becomes irrecoverable in the case of outright default, or the risk of delay in the serving of the loan. In either case, the present value of the assets declines, thereby undermining the solvency of a bank. Credit risk is critical since the default of a small number of important customers can generate large losses, which can lead to insolvency (Bessis, 2002). Credit risk is by far the most significant risk faced by banks and the success of their business depends on accurate measurement and efficient management of this risk to a greater extent than any other risks (Gieseche, 2004).

In terms of empirical results, Bourke (1989) states that the effect of credit risk on bank profitability appears to be clearly negative. This result may be explained by taking into account the fact that the more financial institutions are exposed to high-risk loans, the higher is the accumulation of unpaid loans, implying that these loan losses have produced lower returns to many commercial banks (Miller & Noulas, 1997).

In contrast, Abreu and Mendes (2002) find that loan-to-asset ratio has a positive impact on interest margin and profitability. Similarly, Ben Naceur (2003) concludes that loans have a positive impact on profitability. On the other hand, Hassan and Bashir (2003), and Staikouras and Wood (2003), show that a higher loan ratio affects profits negatively. Similarly, Athanasoglou et al., (2005) find a negative relationship between credit risk and profitability. The sign of the coefficient indicates that the higher the credit risk assumed by a bank, the higher the accumulation of defaulted loans. In turn, the higher the level of loans in default, the greater the negative impact on bank profitability. Moreover, Athanasoglou et al., (2006b) reveal that increased exposure to credit risk lowers profits. In addition, Vong and Chan (2006) find that the quality of assets, as measured by loan loss provision, affects the performance of banks negatively. Al-Hashimi (2007) finds that credit risk and market power explain most of the variation of bank profitability. On the other hand, Li (2007) concludes that loan loss reserves has a negative impact on profit and statistically significant. This implies that higher credit risk results in lower profit.

On the other hand, Ben Naceur and Omran (2008) find that bank-specific characteristics in particular credit risk, has a positive and significant impact on net-interest margin, cost efficiency, and profitability. Similarly, Sufian and Habibullah (2009) indicate that credit risk has a positive impact on the state-owned commercial banks profitability. Contrary to the previous study, Alexiou and Sofoklis (2009) find the value of the credit risk coefficient is negatively and significantly related to bank profitability. It appears that Greek banks implement risk-averse strategies in their attempt to maximize profits, mainly through systematic controls and monitoring of credit risk. On the other hand, Dietrich and Wanzenried (2011) report that credit risk is insignificant in the total sample and in before the financial crisis and turned out to be significant and negative during the crisis. They propose that, before the crisis period, Swiss banks reported very low loss provisions, while during the crisis period, these provisions increased significantly. Likewise,

Ommeren (2011) finds the credit risk has a negative relationship with profitability. The coefficient is substantially higher during the crisis than before the crisis. Furthermore, Sufian (2011) reports that the impacts of credit risk and overhead costs are always negative whether he controls for the macroeconomic and financial conditions or not. Similarly, Ramadan et al., (2011) show that high Jordanian banks profitability tends to be associated with low credit risk. Furthermore, Bolt et al., (2012) find that, among the different components of bank profit, loan losses are the main driver of bank profitability.

Size is introduced to account for existing economies or diseconomies of scale in the market. Short (1979) argues that size is closely associated with capital adequacy of a bank since relatively large banks tend to raise less expensive capital and consequently appear more profitable. On the other hand, Smirlock (1985) finds a positive relationship between size and bank profitability. Nevertheless, many other researchers suggest that little cost savings can be achieved by increasing the size of a banking firm (Berger et al., 1987). Using similar argument, Haslem (1968), Molyneux and Thornton (1992), and Bikker and Hu (2002), link bank size to capital ratio. Similarly, Kosmidou et al., (2006) show that the size of the bank has a positive impact on profitability. In addition, Williams (2003) finds that profits are a positive function of the size of Australian banks. In contrast, Ben Naceur (2003) notices that bank size has a negative impact on profitability. Moreover, bank size is significantly negative with profitability. Hence, the bigger the banks, the more they face diseconomies of scale beyond a certain level, and the smaller the banks, the more they achieve economies of scale up to a specific level (Pasiouras & Kosmidou, 2007).

In addition, Ben Naceur and Goaid (2008) reveal that size is negatively related to bank profitability. Sufian and Habibullah (2009) obtained the same results. They find that size results in lower profitability of city commercial banks. Conversely, Alexiou and Sofoklis (2009) find that the coefficient of the size variable as measured by the logarithm of assets is positive and highly significant, reflecting the advantages of being a large company in the financial services sector. The estimated coefficient shows that the effect of bank size on profitability is positive, a fact that is in line with the economies of scale theory. Similarly, Flamini, McDonald, and Schumacher (2009) studied the determinants of bank profitability for the sub-Saharan African countries. Their findings show that higher returns on assets are associated with larger bank size. On the other hand, Ommeren (2011) finds no evidence for the hypothesis of economies of scale or diseconomies of scale after a certain level, where the size of bank affects positively and insignificantly its profitability both in the subsamples and the total sample. However, Ramadan et al., (2011) show that the estimated effect of size did not support the significant of economies of scale for Jordanian banks profitability.

Bank expenses are also a very essential determinant of profitability, closely related to the notion of efficient management. For example, Bourke (1989), and Molyneux and Thornton (1992) find a positive relationship between better-quality management and profitability. On the other hand, Ben Naceur (2003) notices that high net interest margin and profitability are likely to be associated with banks with high amount of capital and large overheads. Similarly, Amor, Tascon, and Fanjul (2006) show that a lower overhead ratio improves profitability by reducing the type of costs, which is generally considered a signal of efficiency. In addition, Kosmidou et al., (2006) show that efficient management affects profitability positively. However, Pasiouras and Kosmidou (2007) report that cost-income ratio influences profitability negatively and significantly. Similarly, Sufian and Habibullah (2009) show that the effect of overhead cost is negative and it results in lower profitability of city commercial banks. Furthermore, Alexiou and Sofoklis (2009)

find that efficiency as measured by the cost to income ratio is negative and has a high significant effect on profitability. This implies that efficient cost management is a prerequisite for improving profitability of the Greek banking system.

Moreover, Ben Naceur and Kandil (2009) find that the increase in management efficiency is one of the factors that contributed positively to banks profitability in the post-regulation period. However, Dietrich and Wanzenried (2011) report that cost-to-income ratio is negatively significant in both the subsamples and the total sample. This means the more the cost the bank incur, the lower the profits will be. Similarly, Ommeren (2011) finds that the parameter of bank efficiency is negative and significant in both the total sample and the subsamples. He explains that this result is rather straightforward since the cost-to-income ratio is merely included to prevent the omitted variable bias. On the other hand, Ramadan et al., (2011) show that a high Jordanian bank profitability tends to be associated with efficiency cost management. Moreover, Curak et al., (2012) find that among internal factors of bank profitability, the most important one is operating expense management factor for banks in the Republic of Macedonia.

### **3 The Hypotheses of the Study**

This study examines eight null hypotheses to investigate the relationship between selected macroeconomic, industry, bank-specific variables, and banks profitability. These hypotheses are:

**H<sub>01</sub>:** There is no statistical significant relationship between bank profitability and inflation rate.

**H<sub>02</sub>:** There is no statistical significant relationship between bank profitability and real GDP growth rate.

**H<sub>03</sub>:** There is no statistical significant relationship between bank profitability and concentration ratio.

**H<sub>04</sub>:** There is no statistical significant relationship between bank profitability and capital size.

**H<sub>05</sub>:** There is no statistical significant relationship between bank profitability and liquidity risk.

**H<sub>06</sub>:** There is no statistical significant relationship between bank profitability and credit risk.

**H<sub>07</sub>:** There is no statistical significant relationship between bank profitability and bank size.

**H<sub>08</sub>:** There is no statistical significant relationship between bank profitability and management efficiency.

## **4 Data, Model Specification, and Methodology**

### **4.1 Description of the Data and Variables Definition**

This study investigates the relationship between banks profitability and bank-specific, industry-specific, and macroeconomic variables. Excluding Islamic banks due to their specific-characteristics, the study initial sample consists of all conventional, traditional banks in Syria (17 banks). Although there are some differences between private and

public banks in Syria, market share of public banks has been decreased during the period of the study (2004-2011). However, the study could not exclude them because they still have the largest market share until the end of 2011<sup>4</sup>. Data were obtained from banks' annual reports and from the website of Damascus Securities Exchange, <http://www.dse.sy>. The variables that are used in the study consist of return on average assets (ROAA) calculated by dividing net income before tax on average total assets, return on average equity (ROAE) calculated by dividing net income before tax on average total equity<sup>5</sup>, as well as inflation rate (INF), real GDP growth rate (GDP), concentration ratio measured by using Herfindahl-Hirschman index (HHI), capital size (CAP) calculated by dividing total equity on total assets, liquidity risk (LIQD) measured by dividing liquid assets on total deposits, credit risk (PL) measured as loans loss provisions divided by total loans, bank size (LN) measured as the natural logarithm of total assets, and management efficiency (OPEX) measured by dividing operational expenses on total assets. It is important to mention that years after 2011 were excluded from the sample to avoid inaccuracy due to the ongoing crisis in Syria.

## 4.2 The Research Methodology

This study employs (Levin, Lin & Chu, 2002) (LLC) test to examine stationarity. This test assumes that there is a common unit root process so that  $\rho_i$  is identical across cross-sections. The test employs a null hypothesis of a unit root. LLC consider the following basic Augmented Dickey-Fuller (ADF) specification:

$$\Delta y_{it} = a y_{it-1} + \sum_{j=1}^k \beta_{ij} \Delta y_{it-j} + X_{it} \delta + \varepsilon_{it} \quad (1)$$

Here, it is assumed a common  $a = \rho - 1$ , but allow the lag order for the different terms,  $\rho_i$ , to vary across cross-sections. The null and alternative hypotheses for the test may be written as  $H_0: a = 0$ ,  $H_1: a < 0$ . Under the null hypothesis, there is a unit root, while under the alternative, there is no unit root. In addition, the study uses (Im, Pesaran & Shin, 2003); Fisher-type tests using ADF, and Phillips Perron (PP) tests (Maddala & Wu, 1999). The Im, Pesaran, and Shin (IPS), the Fisher-ADF, and PP tests all allow for individual unit root processes so that  $\rho_i$  may vary across cross-sections. The tests are all considered by the joining of individual unit root tests to derive a panel-specific result. IPS test initiates by specifying a separate ADF regression for each cross section in equation (1). The null hypothesis could be written as  $H_0: \alpha_i = 0$ , for all  $i$  under the null hypothesis, there is a unit root, while the alternative hypothesis is given by:

$$H_1: \begin{cases} a = 0 & \text{for } i = 1, 2, \dots, N_1 \\ a < 0 & \text{for } i = N + 1, N + 2, \dots, N \end{cases}$$

Consequently, the alternative hypothesis is some cross-sections without unit root.

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<sup>4</sup>The market share of public banks measured by total assets was 97.7% of all total assets banking sector in the year of 2004 and was 72.66 % of all total assets banking sector in the year of 2011.

<sup>5</sup>The study uses the average value in order to control the differences that occur in assets during the fiscal year.

Maddala and Wu (1999) have proposed an alternative methodology to panel unit root tests that uses Fisher (1932) results to derive tests that combine the  $p$ -values from individual unit root tests. The null hypothesis and the alternative will be the same as IPS. For both Fisher tests, the study should identify the exogenous variables to test the equations. The study may select to include no exogenous regressors, to include individual constants (effects), or include individual constant and trend terms. Furthermore, when the Fisher tests are based on ADF test statistics, the study should identify the number of lags used in each cross-section of ADF regression. For the PP test, the study should instead identify a technique for estimating. If the results reject the null hypothesis, then the series is stationary. Nevertheless, the test statistics corrects for some serial correlation and heteroscedasticity in the residuals. These tests are shown with and without the trend term. This study utilized the methodology that was built on the model proposed by Athanasoglou et al., (2006a), Flamini et al., (2009), Ommeren (2011), and Dietrich and Wanzenried (2011), as in equation (2).

$$\pi_{it} = c + \sum_{j=1}^J \beta_j X_{it}^j + \sum_{l=1}^L \beta_l X_{it}^l + \sum_{m=1}^M \beta_m X_{it}^m + u_{it} \quad (2)$$

Where:

$$u_{it} = \mu_i + v_{it} \quad (3)$$

( $\pi_{it}$ ): represents the dependent variable and measures bank profitability, estimated by ROAE or ROAA, for bank  $i$  at time  $t$ , with  $i = 1 \dots N$  and  $t = 1 \dots T$ .  $N$ : represents the number of cross-sectional observations and  $T$  the length of the sample period.  $c$ : denotes to the constant term. ( $\beta$ ): refers to a vector of  $k \times 1$  parameters that estimate the sign and the slope of parameters for all explanatory variables. ( $X_{it}^j$ ): denotes to the bank-specific variables. ( $X_{it}^l$ ): denotes to the industry-specific variables. ( $X_{it}^m$ ): denotes to the macroeconomic variables. ( $u_{it}$ ): refers to the disturbance error. ( $\mu_i$ ): refers to the unobserved heterogeneity (the fixed effect). ( $v_{it}$ ): refers to the idiosyncratic error. This model is a one-way error component regression, where ( $\mu_i$ ) is  $\sim$  IIN ( $0, \sigma_{\mu_i}^2$ ) and independent of ( $v_{it}$ ) which is  $\sim$  IIN ( $0, \sigma_{v_{it}}^2$ ). Bank profitability shows a tendency to persist over time, reflecting barriers to market competition (Berger, Bonime, Covitz, & Hancock, 2000). Therefore, the study adopts a dynamic characteristic of the model by including a one-period lagged dependent variable ( $\pi_{i,t-1}$ ) of bank ( $i$ ) at time ( $t - 1$ ) among the regressors. Accordingly, equation (2) is expanded with the lagged profitability to become:

$$\pi_{it} = c + \delta \pi_{i,t-1} + \sum_{j=1}^J \beta_j X_{it}^j + \sum_{l=1}^L \beta_l X_{it}^l + \sum_{m=1}^M \beta_m X_{it}^m + u_{it} \quad (4)$$

( $\pi_{i,t-1}$ ): represents the one-period lagged dependent variable. ( $\delta$ ): represents the coefficient of the one-period lagged dependent variable, which measures the speed of adjustment of bank profitability to equilibrium. Athanasoglou et al., (2006a) reported that a value of ( $\delta$ ) between 0 and 1 indicates that profits persist and they will eventually return to their average level. A value close to 0 means that the banking industry is properly competitive (high speed of adjustment); while a value close to 1 means that the banking industry is less competitive (very low adjustment).

There are some basic problems introduced by the inclusion of a lagged dependent variable. Since  $(\pi_{it})$  is a function of  $(\mu_i)$ , it immediately follows that  $(\pi_{i,t-1})$  is also a function of  $(\mu_i)$ . Therefore,  $(\pi_{i,t-1})$ , a right-hand regressor in equation (4), is correlated with the error term. This renders the ordinary least squares (OLS) estimator biased and inconsistent even if the  $(u_{it})$  is not serially correlated (Baltagi 2005 P. 135). So, taking into consideration that one of the explanatory variables is  $(\pi_{i,t-1})$  fetches the endogeneity problem. This disturbs one of the (OLS) assumptions which states that all the explanatory variables are uncorrelated with the error term (exogenous<sup>6</sup>) and that the error terms are homoscedastic and nonautocorrelated<sup>7</sup>. Furthermore, previous literature review stated that the distribution of data is often skewed with many outliers; hence, they are heavy-tailed. Therefore, by using (OLS) technique in a dynamic model specification as equation (4) probably disturbs one of its classical assumptions, which make it inconsistent, biased, or inefficient estimator<sup>8</sup>.

A fundamental assumption of regression analysis is that the right-hand side variables are uncorrelated with the disturbance term. If this assumption is violated, OLS is biased and inconsistent. There are a number of situations where some of the right-hand side variables are correlated with disturbances. Some classic examples occur when there are endogenously determined variables on the right-hand side of the equation and when the right-hand side variables are measured with error<sup>9</sup>. The standard approach in cases where the right-hand side variables are correlated with the residuals is to estimate the equation using instrumental variables regression. The idea behind instrumental variables is to find a set of variables, termed instruments that are both (1) correlated with the explanatory variables in the equation, and (2) uncorrelated with the disturbances. These instruments are used to eliminate the correlation between the right-hand side variables and the disturbances. There are many different approaches for using instruments to eliminate the effect of variable and residual correlation such as, the Two-stage Least Squares (TSLS), the Limited Information Maximum Likelihood and K-Class Estimation (LIML), and the Generalized Method of Moments (GMM). The GMM estimator belongs to a class of estimations known as M-estimators that are defined by minimizing some criterion function. GMM is a robust estimator that does not require information of the exact distribution of the disturbances. GMM estimation is based upon the assumption that the disturbances in the equations are uncorrelated with a set of instrument variables. In contrast to OLS, GMM technique provides a method of formulating models and implied estimators without making strong distributional assumptions (Greene, 2003). The GMM

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<sup>6</sup>According to Greene (2003), exogeneity states that the expected value of the disturbance at observation  $i$  in the sample is not a function of the independent variables observed at any observation. This means that the independent variables will not carry useful information for prediction of  $(u_{it})$ .

<sup>7</sup>Homoscedasticity means that each disturbance  $(u_{it})$  has the same finite variance  $(\sigma^2)$ , while no autocorrelation means that the disturbance error is uncorrelated with every other disturbance.

<sup>8</sup>One of the (OLS) assumptions is that, data follow normal distribution (the skewness is zero and the kurtosis is 3).

<sup>9</sup>Variables that are correlated with the residuals are referred to as endogenous, and variables that are not correlated with the residuals as exogenous or predetermined.

estimator selects parameter estimates so that the correlations between the instruments and disturbances are as close to zero as possible, as defined by a criterion function. By choosing the weighting matrix in the criterion function appropriately, GMM can be made robust to heteroscedasticity and autocorrelation of unknown form. A large proportion of the recent empirical works in econometrics, particularly in macroeconomic and finance, have employed GMM estimators. The GMM provides an estimation framework that includes the least squares, nonlinear least squares, instruments variables, maximum likelihood, and a general class of estimators (Greene, 2003).

The starting point of GMM estimation is the assumption that there are a set of ( $L$ ) moment conditions that the  $K$ -dimensional parameters of interest, ( $\beta$ ) should satisfy. As with other instrumental variables estimators, for the GMM estimator to be identified, there must be at least as many instruments as there are parameters in the model. In models where there are the same numbers of instruments as parameters, the value of the optimized objective function is zero. If there are more instruments than parameters, the value of the optimized objective function will be greater than zero. In fact, the value of the objective function, termed the ( $J$ -statistic), can be used as a test of over-identifying moment conditions<sup>10</sup>.

There are two commonly GMM techniques; the Difference GMM estimator as presented in Arellano and Bond (1991) and the System GMM estimator as presented in Arellano and Bover (1995). Arellano and Bond (1991) propose a test for the hypothesis that there is no second-order serial correlation for the disturbances of the first-differenced equation. This test is important because the consistency of the GMM estimator relies upon the fact that  $E[\Delta v_{it} \Delta v_{it-2}] = 0$ . This hypothesis is true if the ( $v_{it}$ ) is not serially correlated or follow a random walk. Under the latter situation, both OLS and GMM of the first-differenced version of (4) are consistent (Baltagi 2005, P.141). In addition, Arellano and Bond (1991) argue that additional instruments can be obtained in a dynamic panel data model if one utilizes the orthogonality conditions that exist between lagged values of ( $\pi_{it}$ ) and the disturbances ( $u_{it}$ ) (Baltagi 2005, P. 136). Roodman (2009) states that Arellano and Bond (1991) estimation starts by transforming all regressors, usually by differencing, and uses the generalized method of moments (GMM), and is called difference GMM.

According to Baltagi (2005) and Roodman (2009), the Difference GMM technique first differentiates equation (4) in time to remove the fixed effect in the error term ( $\mu_i$ ). The first-differentiated equation is then estimated by using lags of the potential predetermined and endogenous explanatory variables. These lags are used as instrumental variables in the transformed equation. Therefore, the Difference GMM technique overcomes the endogeneity and autocorrelation problems by using lagged values of the independent variables as instruments and by eliminating the unobserved heterogeneity in the error term (Ommeren, 2011).

Arellano (1989) finds that for simple dynamic error components models, the estimator that uses differences ( $\Delta\pi_{i,t-2}$ ) rather than levels ( $\pi_{i,t-2}$ ) for instruments has a singularity point and very large variances over a significant range of parameter values. In contrast, the estimator that uses instruments in levels ( $\pi_{i,t-2}$ ) has no singularities and much smaller variances and is therefore recommended. Arellano and Bond (1991) proposed a generalized method of moments (GMM) procedure that is more efficient than

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<sup>10</sup>E-Views 7 User's Guide II, Quantitative Micro Software, 2009.

the Anderson and Hsiao (1982) estimator. This literature is generalized and extended by Arellano and Bover (1995) and (Baltagi (2005)). The other way to work around the endogeneity problem is to instrument  $(\pi_{i,t-1})$  and any other similarly endogenous variables with variables thought uncorrelated with the fixed effects. This strategy is adopted by the System GMM estimator. Roodman (2009) reports that, one of the weak points of the first-difference transform method is that it magnifies gaps in unbalanced panels. If some  $(u_{it})$  is missing, for example, then both  $\Delta(\pi_{it})$  and  $\Delta(\pi_{it+1})$  are missing in the transformed data. One can construct datasets that completely disappear in first differences. This motivates the second common transformation, called “forward orthogonal deviations” or “orthogonal deviations” (Arellano and Bover 1995).

Instead of differencing, there is another way to work around the endogeneity. It is to instrument  $(\pi_{i,t-1})$  and any other similarly endogenous variables with variables thought uncorrelated with the fixed effects, which is called the System GMM estimator (Roodman 2009, P.102).

The system GMM estimator uses lagged differences of  $(\pi_{it})$  as instruments for equations in levels, in addition to lagged levels of  $(\pi_{it})$  as instruments for equations in first differences. The system GMM estimator is shown to have dramatic efficiency gains over the basic first-difference GMM as  $(\delta) \rightarrow 1$  and  $(\sigma_{\mu_i}^2 / \sigma_{u_{it}}^2)$  increases. However, the system GMM estimator not only improves the precision but also reduces the finite sample bias (Baltagi 2005, P. 148).

Instead of subtracting the previous observation from the contemporaneous one, it subtracts the average of all future available observations of a variable. No matter how many gaps, it is computable for all observations except the last for each individual, so it minimizes data loss. Moreover, because lagged observations do not enter the formula, they are valid as instruments. Where in the equation in levels, the variables are instrumented with their own first differences while in the difference equation the lagged levels are used as instruments (Roodman 2009, P. 104).

To sum up, this study estimates the parameter coefficients by using the System GMM technique as described in Arellano and Bover (1995).

## 5 Data Analysis and Hypotheses Testing

### 5.1 Descriptive Analysis

Table 1 presents the descriptive statistics for the dependent and independent variables. It indicates that the Syrian banks have, on average, a positive profit throughout the year 2004-2011. For the total sample, the mean for ROAE and ROAA equals 13.29%, 0.63%, with a minimum of -63.54%, -6.26%, and with a maximum of 157.86%, and 4.85% respectively. There is more variation in profitability reflected by the difference between the mean and median. These figures report a median of 11.7%, 0.86% and a standard deviation of 23.55%, 1.87% for ROAE and ROAA respectively. The mean of CAP equals to 16.32% with a minimum of 1.5% and a maximum of 93.58%. Therefore, we can infer that there are more variation in equity to assets ratio reflected in the standard deviation of 21.34%. The mean of LIQD variable equals to 92.26% with a minimum of 4.83% and a maximum of 2675.28%. Similarly, we can notice that there are also more variation in liquidity ratio reflected in the standard deviation of 303.92%.



The mean of INF equals to 6.73% with a minimum of 2.8% and a maximum of 15.15%. Therefore, we can infer that there is less variation in inflation ratio reflected in the standard deviation of 4%. On the other hand, the mean of the GDP equals to 4% with a minimum of -3% and a maximum of 6.9%. Therefore, we can observe that there is less variation in real gross domestic product growth rate reflected in the standard deviation of 3%. Moreover, the mean of HHI variable equals to 29.71% with a minimum of 19% and a maximum of 55.37%. Therefore, we can also conclude that there is less variation in concentration ratio reflected in the standard deviation of 11.47%. However, the mean of PL variable equals to 1.96% with a minimum of 0.01% and a maximum of 6.35%. Therefore, we can also notice that there is less variation in the credit risk reflected in the standard deviation of 1.54%. Similarly, the mean of OPEX equals to 1.51% with a minimum of 0.11% and a maximum of 5.13% indicating that there is less variation in operating expense ratio reflected in the standard deviation of 1.1%. In addition, all series (ROAE, ROAA, INF, GDP, HHI, CAP, PL, and OPEX), except for the LN series; do not follow a normal distribution which violates one of the assumptions of OLS estimator.

Table 1: Descriptive Statistics for the Dependent and Independent Variables

	ROAE	ROAA	INF	GDP	HHI	CAP	LIQD	PL	LN	OPEX
Mean	13.29%	0.63%	6.73%	4.02%	29.71%	16.32%	92.26%	1.96%	24.55	1.51%
Median	11.70%	0.86%	4.75%	5.05%	27.12%	8.32%	33.83%	1.52%	24.74	1.27%
Maximum	157.86%	4.85%	15.15%	6.90%	55.37%	93.58%	2675.28%	6.35%	27.49	5.13%
Minimum	-63.54%	-6.26%	2.80%	-3.00%	19.06%	1.50%	4.83%	0.01%	21.25	0.11%
Std. Dev.	23.55%	1.87%	4.05%	3.07%	11.47%	21.34%	303.92%	1.54%	1.41	1.10%
Skewness	1.98	-0.86	1.15	-1.59	1.07	2.39	6.87	0.80	-0.17	1.23
Kurtosis	15.20	5.11	2.97	4.16	2.95	7.63	53.74	2.65	3.21	4.24
Jarque-Bera	760.53	34.28	24.67	53.18	21.37	204.99	12782.23	9.02	0.72	35.03
Probability	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0110	0.6981	0.0000
Observations	111	111	111	111	111	111	111	80	111	111

## 5.2 Correlation Matrix

Table 2 depicts the correlations between the explanatory variables and the dependent variables. We find that the natural logarithm of total assets (LN) is mostly, positively, and significantly correlated of 45.9% with ROAA, positively and significantly correlated of 33.8% with ROAE. Similarly but insignificantly, inflation rate (INF) and concentration ratio (HHI) are positively correlated of 5.3% and 8.4% respectively with ROAA, and positively correlated of 11.1% and 24.6% respectively with ROAE. In contrast, the loan loss provision to total loans (PL) seems to be negatively and significantly correlated with both of profitability measures of -21.8% with ROAA and -30.7% with ROAE, indicating that, when the loan loss provisions increase, profitability moves to the opposite direction. Likewise, operational expenses to total assets ratio (OPEX) seems to be negatively and significantly correlated with both the profitability measures of -30.1% with ROAA and -37.8% with ROAE. Furthermore, the total equity to total assets (CAP) is positively correlated of 20.5% with ROAA and negatively correlated of -19.3% with ROAE. On the other hand, the liquidity of a bank (LIQD) is positively correlated of 4% with ROAA and negatively correlated of -5% with ROAE. In contrast to liquidity risk and capital size, the

GDP growth rate is negatively correlated of -6.4% with ROAA and positively correlated of 16.9% with ROAE.

Table 2 : Correlation Matrix of Dependent and Independent Variables

	ROAA	ROAE	INF	GDP	HHI	CAP	LIQD	PL	LN
ROA	1.000								
	-----								
ROA	0.756	1.000							
	0***	-----							
INF	0.053	0.111	1.000						
	0.643	0.325	-----						
GDP	-0.064	0.169	0.122	1.000					
	0.571	0.134	0.282	-----					
HHI	0.084	0.246	0.243	0.545	1.000				
	0.459	0.028**	0.030*	0***	-----				
CAP	0.205	-0.193	-0.182	-0.335	-0.20	1.000			
	0.06*	0.085*	0.107	0.002*	0.06*	-----			
LIQD	0.040	-0.050	0.010	-0.140	-0.23	0.338	1.000		
	0.725	0.663	0.933	0.216	0.03*	0.002**	-----		
PL	-0.218	-0.307	-0.070	-0.418	-0.18	-0.068	-0.147	1.000	
	0.052*	0.0055*	0.535	0.0***	0.106	0.547	0.195	-----	
LN	0.459	0.338	0.076	0.095	-0.01	-0.201	-0.247	0.116	1.00
	0***	0.002**	0.501	0.402	0.864	0.07*	0.027*	0.305	-----
OPE	-0.301	-0.378	-0.232	-0.453	-0.21	0.403	0.150	0.220	-0.52
	0.006*	0.0006*	0.038*	0***	0.053	0.0002*	0.185	0.0504	0***

Notes: \*\*\*, \*\*, \* indicate significance at the 1%, 5%, and 10% levels,

To check whether these variables are collinear, we perform variance inflation factor (VIF) test for each variable entering the regression models. Table 3 represents the Variance Inflation Factor (VIF) for ROAA and ROAE as dependent variables. As it could be seen, all figures in table 3 are less than five, suggesting that multicollinearity is not a problem in this study (Kennedy, 1998).

Table 3: Variance Inflation Factor (VIF)

Dependent Variable ROAA			Dependent Variable ROAE		
Variable	Coefficient Variance	VIF	Variable	Coefficient Variance	VIF
ROAE	0.0000	1.5	ROAA	1.1924	1.87
INF	0.0004	1.15	INF	0.0850	1.14
GDP	0.0011	2.21	GDP	0.2473	2.36
HHI	0.0001	1.75	HHI	0.0233	1.76
CAP	0.0001	1.5	CAP	0.0253	1.59
LIQD	0.0000	1.29	LIQD	0.0055	1.29
PL	0.0039	1.63	PL	0.8047	1.59
LN	0.0000	1.77	LN	0.0003	2.08
OPEX	0.0125	2.09	OPEX	2.7207	2.14

Table 4 depicts the panel unit root test for a series that includes one of the explanatory variables and one of the dependent variables.

Table 4: Panel Unit Root Tests

Series	Exogenous variables	LLC test		IPS test		ADF test		PP test	
		Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.
ROAA-INF	Individual	-3.89178	0.000***	-2.15485	0.015**	53.7926	0.002***	76.7515	0.000***
ROAE-INF	Individual	-5.83649	0.000***	-1.48933	0.068*	43.0333	0.034**	53.4939	0.002***
ROAA-GDP	Individual	-14.2839	0.000***	-3.929	0.000***	71.9048	0.000***	43.4204	0.031**
ROAE-GDP	Individual	-8.17828	0.000***	-2.19982	0.013**	50.2566	0.006***	65.1838	0.000***
ROAA-HHI	Individual	-13.5301	0.000***	-4.41318	0.000***	73.9989	0.000***	73.9003	0.000***
ROAE-HHI	Individual	-7.41177	0.000***	-2.93187	0.001***	61.1574	0.000***	87.9819	0.000***
ROAA-CAP	Individual	-24.7076	0.000***	-5.54722	0.000***	70.7912	0.000***	78.5251	0.000***
ROAE-CAP	Individual	-7.42582	0.000***	-1.29355	0.097*	46.5215	0.015**	64.7405	0.000***
ROAA-LIQD	Individual	-9.1915	0.000***	-3.02467	0.001***	60.8897	0.000***	55.6735	0.001***
ROAE-LIQD	Individual	-7.27838	0.000***	-2.41804	0.007***	53.8812	0.002***	58.8548	0.000***
ROAA-PL	Individual	-0.31087	0.378	2.64436	0.995	20.8184	0.532	29.6081	0.128
ROAA-PL	None	-19.8381	0.000***	-	-	49.2572	0.003***	47.9628	0.005***
ROAE-PL	Individual	-1.91937	0.027**	-0.17449	0.43	18.9191	0.65	26.4224	0.234
ROAE-PL	with trend	-27.6875	0.000***	-1.38737	0.082*	28.1832	0.105	45.9469	0.000***
ROAA-LN	Individual	0.68718	0.754	-	-	41.3592	0.049**	99.6948	0.000***
ROAA-LN	with trend	-17.3318	0.000***	-	-	39.9009	0.067*	58.9296	0.000***
ROAE-LN	Individual	-16.0356	0.000***	-5.38485	0.000***	85.7931	0.000***	97.0166	0.000***
ROAA-OPEX	Individual	-12.3624	0.000***	-4.16477	0.000***	75.9322	0.000***	89.1608	0.000***
ROAE-OPEX	Individual	-5.88935	0.000***	-1.86297	0.031**	46.6492	0.014**	64.2736	0.000***

Notes: \*\*\*, \*\*, \* indicate significance at the 1%, 5%, and 10% levels, respectively.

The tests are reported with individual effects, individual linear trends effects, and none effects as exogenous variables. The automatic lag length selection is based on Schwarz Info Criterion (SIC) for the level. These tests are done by using Levin, Lin, & Chu (LLC) test to examine the unit root, which assumes common unit root process with the null hypothesis of unit root and an alternative hypothesis of no unit root; and by using Im, Pesaran, & Shin W-stat (IPS), ADF-Fisher Chi-square (ADF-Fisher), and PP-Fisher Chi-square (PP-Fisher) tests to test the unit root, which assume individual unit root process with the null hypothesis of unit root and an alternative hypothesis of some cross-sections without unit root.

The results show that, when the exogenous variables is individual effects, all (INF, GDP, HHI, CAP, LIQD, OPEX) series with both dependent variables are stationary except for (PL, LN) series, where all tests report that (PL-ROAA) series are non-stationary. ADF and PP tests report that (PL-ROAE) series are also non-stationary. In addition, LLC test reports that (LN-ROAA) series is non-stationary, but when the exogenous variables are none, we find that (PL-ROAA) series is stationary, and when the exogenous variables are

individual linear trends effects, we find the LLC, IPS, and PP tests report that (PL-ROAE) is stationary, and the LLC, ADF, and PP tests report that (LN-ROAA) is also stationary.

### 5.3 Hypotheses Testing

Tables 5 and 6 report the regression outcomes using ROAA and ROAE as measures of banks profitability.

Table 5: GMM Estimation (ROAA is the Dependent Variable)

Variable	Coefficient	Std. Error	t-Statistic	Prob.	
ROAA(-1)	-0.133775	0.055044	-2.43032	0.0192	**
INF	0.01716	0.011578	1.482105	0.1454	
GDP	-0.11317	0.026561	-4.260724	0.0001	***
HHI	-0.015577	0.01264	-1.232347	0.2244	
CAP	0.01316	0.014797	0.889388	0.3786	
LIQD	-0.010015	0.004539	-2.20655	0.0326	**
PL	-0.439609	0.071567	-6.142621	0.0000	***
LN	0.002959	0.001522	1.944789	0.0582	*
OPEX	0.323718	0.131528	2.461216	0.0178	**
J-statistic	32.42741	Instrument rank	43		

Note 1: \*\*\*, \*\* and \* indicate significance at the 1 %, 5 % and 10 % levels, respectively.

Note 2: ROAA<sub>t</sub> is return on average assets at year t. ROAA<sub>t-1</sub> is return on average assets at year (t-1). INF is inflation rate. GDP is real gross domestic product growth rate. HHI is Herfindahl-Hirschman index. CAP is bank capital size. LIQD is liquidity ratio. PL is credit risk. LN is bank size. OPEX is management efficiency.

According to table 5, the lagged dependent variable ROAA (-1) has a significant (significant at 5%) coefficient equals to -13.3%. The significant coefficient confirms that it should be taken into consideration the profit persistence when explaining banking profitability. Surprisingly, this coefficient indicates that when a bank achieves a negative profit from its assets in the previous year, it is likely that the bank is able to generate a positive profit from its assets this year.

Similarly, table 6 shows that coefficient of the lagged dependent variable ROAE (-1) is significant at the 1% level, confirming the dynamic nature of the model specification. In this study, ( $\delta$ ) takes a value of approximately 50%, which means that profit seems to persist to a moderate extent, and implies that departure from a perfectly competitive market structure in the Syrian banking sector may not be that large.

Table 6: GMM Estimation (ROAE is the Dependent Variable)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROAE(-1)	0.500837	0.052338	9.569357	0.0000 ***
INF	0.327956	0.175089	1.87308	0.0677 *
GDP	-0.472689	0.281127	-1.681409	0.0998 *
HHI	0.147543	0.167766	0.879456	0.3839
CAP	0.088057	0.137949	0.638331	0.5266
LIQD	-0.045139	0.061774	-0.730714	0.4688
PL	-2.561695	0.810572	-3.160355	0.0029 ***
LN	0.005943	0.015548	0.382233	0.7041
OPEX	0.136519	1.45335	0.093934	0.9256
J-statistic	33.04281	Instrument rank	43	

Note 1: \*\*\*, \*\* and \* indicate significance at the 1 %, 5 % and 10 % levels, respectively.

Note 2: ROAA<sub>t</sub> is return on average assets at year t. ROAA<sub>t-1</sub> is return on average assets at year (t-1). INF is inflation rate. GDP is real gross domestic product growth rate. HHI is Herfindahl-Hirschman index. CAP is bank capital size. LIQD is liquidity ratio. PL is credit risk. LN is bank size. OPEX is management efficiency.

Goddard et al., (2004), and Athanasoglou et al., (2008) for which the parameters are also significant at a 1% level, further extensively highlight evidence for profit persistence. Moreover, the parameters for profit persistence of these studies, which equal 35% and 26% respectively, are substantially higher than the one reported in table 5 and a little lower than the one reported in table 6. The coefficient of -13.3% in absolute value is very close to the coefficient of (12.6%) reported by Ommeren (2011), but with the opposite direction of the result showed by Sufian (2011). Since the reported J-statistic is simply the Sargan statistic (value of the GMM objective function at estimated parameters), and the instrument rank of (43) is greater than the number of estimated coefficients (15), we may use it to construct the Sargan test of over-identifying restrictions. Under the null hypothesis that the over-identifying restrictions are valid, the Sargan statistic is distributed as a  $\chi^2(p - k)$ , where ( $k$ ) is the number of estimated coefficients and ( $p$ ) is the instrument rank. We find that the instruments used in this study are valid for both profitability measures. These results were concluded by discovering that the  $p$ -value is (0.25<sup>11</sup>) for table 5 (ROAA is the dependent variable) and the  $p$ -value is (0.23<sup>12</sup>) for table 6 (ROAE is the dependent variable). Consequently, we accept the null hypothesis for test that assumes that the over-identifying restrictions are valid.

Turning to the other explanatory variables, table 5 does not show any statistical significant effect of inflation rate (INF) on ROAA, the coefficient equals 1.7%, but according to table 6, it shows that there is a statistically significant positive effect of inflation rate (INF) on ROAE (significant at the 10% level), the coefficient equals 32.7%.

<sup>11</sup>The p-value of 0.25 was computed by using the scalar `pval=@Chisq (32.42741, 43-15)` in E-views.

<sup>12</sup>The p-value of 0.23 was computed by using the scalar `pval=@Chisq (33.04281, 43-15)` in E-views.

These findings are possible due to the ability of Syrian banks management to satisfactorily, though not fully, forecasts future inflation, which in turn implies that interest rates have been appropriately adjusted to achieve higher profit for shareholders. The study concludes that the interest rates on bank loans are increased at a faster rate than decreasing the interest rates paid on deposits.

By using ROAE as the dependent variable, table 6 indicates that the t-statistic of (INF) is positively significant at the 10% level. Therefore, we reject the null hypothesis and conclude that the (INF) has positively significant effect on ROAE. This finding is similar to the results of Bourke (1989), Molyneux and Thornton (1992), Vong and Chan (2006), Sufian (2011). Most studies (e.g. Bourke, 1989; and Molyneux & Thornton, 1992) have shown a positive relationship between inflation and profitability. Vong and Chan (2006) showed a great relationship between inflation rate and performance of banks, while Sufian (2011) reported that inflation displays a substantial pro-cyclical impact on bank profitability.

However, when profitability is measured by ROAA, our results are similar to the findings of Li (2007), and Ramadan et al., (2011). Li (2007) showed that inflation rate has insignificant impact on performance while Ramadan et al., (2011) showed that inflation has a positive insignificant impact on ROA and ROE. This may suggest that due to the inability of banks to accurately predict the levels of inflation, the banks lose the opportunity to benefit from inflationary environment to increase profits.

In addition, we find that there is a statistical significant (significant at 10% level) negative effect of GDP growth rate on ROAE, the coefficient equals -47.2%. Similarly, table 5 also shows a statistical significant (significant at 1%) negative effect of GDP growth rate on ROAA, the coefficient equals -11.3%. These results are somewhat surprising. It may suggest that banks have not benefited from economic growth and additional business opportunities to increase profitability. One reason for this may be that the bank management could not appropriately invest their funds. Another reason could be that the selected time period (2004-2011) in which all the private banks entered the Syrian banking sector<sup>13</sup>, which led to more intense competition. Finally yet importantly, the negative low value of GDP (-3%) in 2011 could be one of the main reasons that affect the bank profitability negatively. Tables 5 and 6 indicate that the t-statistic of (GDP) are negatively significant at 1%, and 10% respectively. Therefore, we reject the null hypothesis and conclude that the (GDP) has negatively significant effect on both profitability measures ROAA and ROAE.

These results are similar to the findings of Pasiouras and Kosmidou (2007), and Ramadan et al., (2011). Pasiouras and Kosmidou (2007) found that the coefficient of GDP growth in the foreign sample is negatively related to profitability. On the other hand, Ramadan et al., (2011) showed that banks have not benefited from economic growth and additional business opportunities to increase profitability.

In contrast to our estimations, Li (2007) showed that GDP growth rate has insignificant impact on performance. Sufian and Habibullah (2009) found that the impact of the economic growth on profitability is positive while Pasiouras and Kosmidou (2007) found that the coefficient of GDP growth in the domestic sample and in the total sample is positively related to profitability.

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<sup>13</sup>The number of private banks was zero in 2003 and became 11 banks at the end of 2011.

Similarly, both tables 5 and 6 show that concentration ratio influences ROAE positively (coefficient of 14.7%) and influences ROAA negatively (coefficient of -1.5%) but these effects are rather insignificant. Concentration ratio is thus not an explanation of banks profitability indicated by the insignificant coefficients. Tables 5 and 6 indicate that the t-statistic of HHI is insignificant at any conventional levels. Therefore, we accept the null hypothesis of no statistical relationship between HHI and banks profitability. Moreover, this study finds no evidence to support SCP hypothesis. One reason for this may be the notable decreasing in the concentration ratio from 2004 until 2011<sup>14</sup>, which made bank management unable to benefit from the concentration in the market; hence, it could not conduct its operation appropriately; consequently, affected its performance negatively.

This outcome is in accordance with Berger (1995a). The results are also quite comparable to the results of Dietrich and Wanzenried (2011). They also found a positive but negligible coefficient that was not significant in the crisis period. However, that there are other studies that have found a clearly positive and significant relationship (e.g. Bourke, 1989; Short, 1979, and Pasiouras & Kosmidou, 2007) or a significant negative relationship (e.g. Athanasoglou et al., 2008).

Similar to the effect of concentration ratio, the capital size appears to be insignificant in affecting bank profitability. Tables 5 and 6 show that the capital size has a positive insignificant relationship with profitability. The parameter of the capital size (CAP) equals 1.3% and 8.8% when the dependent variables are ROAA and ROAE, respectively. Consequently, since both tables indicate that the t-statistic of CAP is insignificant, we cannot reject the null hypothesis and conclude that the CAP has positively insignificant effect on both profitability measures, ROAA and ROAE.

Our results (the positive effect of capital) are similar to the findings of Berger (1987), Bourke (1989), Berger (1995), Demirguc-Kunt and Huizinga (1999), Kosmidou et al., (2006), Pasiouras and Kosmidou (2007), Ben Naceur and Goaied (2008), Ben Naceur and Omran (2008), Sufian and Habibullah (2009), and Ommeren (2011). They all found positive relation between capital and bank profitability. However, contrast to our results, Dietrich and Wanzenried (2011) found that the coefficient of equity-to-asset ratio is significant and negative.

As for the liquidity risk variable, the empirical results show that the liquidity has a negative relationship with profitability. The parameter of the liquidity risk (LIQD) equals -1% and is significant at the 5% level when the dependent variable is ROAA and equals 4.5% and is not significant when the dependent variable is ROAE. This implies that higher liquidity risk results in lower profits. Consequently, when using ROAA as the dependent variable, table 5 indicates that the t-statistic of LIQD is negatively significant. Therefore, we reject the null hypothesis and conclude that the LIQD has negatively significant effect on ROAA.

When the profitability is measured by ROAA, our results are similar to the findings of Molyneux and Thornton (1992), Guru et al., (1999); Pasiouras and Kosmidou (2007); Sufian (2011). They all found negative and significant relationship between liquidity and bank profitability. On the other hand, our results stand in contract to Pasiouras and Kosmidou (2007), and Sufian and Habibullah (2009). They both found positive relationship between liquidity structure and banks profitability.

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<sup>14</sup>The estimations of the study show that there was a considerable fall in HHI, 55.3% in 2004 and 22.85% in 2011.

However, when profitability is measured by ROAE, our results are similar to the findings of Li (2007), and Ommeren (2011). Li (2007) showed that liquidity effect is mixed and not significant, and conclusion about the impact of liquidity remains questionable and that further research is needed. Similarly, Ommeren (2011) found little support that the variable liquid assets to short-term funding (excluding derivatives) is a determinant for banks profitability and it appears to be insignificant in all periods suggesting that liquidity requirements does not influence profitability.

An important finding of this study is that credit risk has significant and negative effect on profitability. The parameter of the loan loss provisions to loans (PL) equals -43.9% and is significant at the 1% level when the dependent variable is ROAA and equals 256% and is significant at the 1% level when the dependent variable is ROAE. It is also noted that this coefficient has the most explanatory power of the model. This implies that higher credit risk results in lower profits. This shows that in the Syrian banking sector, managers attempt to maximize profits by adopting a risk-averse strategy, mainly through policies that improve screening and monitoring credit risk. Consequently, since both tables 5 and 6 indicate that the t-statistic of PL is negatively significant, we reject the null hypothesis and conclude that PL has negatively significant effect on ROAA and ROAE.

This result is similar to the findings of Bourke (1989), Athanasoglou et al., (2006b), Vong and Chan (2006), Li (2007), Sufian (2011), and Ramadan et al., (2011). They all reported negative relationship between credit risk and profitability. However, Ben Naceur and Omran (2008), and Sufian and Habibullah (2009) found that credit risk has a positive and significant impact on banks profitability.

The empirical results related to bank size reveal that bank size has a positive relationship with profitability. The parameter of (LN) equals 0.29% and is significant at the 10 percent level when the dependent variable is ROAA, and equals 0.59% and is not significant when the dependent variable is ROAE. Consequently, by using ROAA as the dependent variable, table 5 indicates that the t-statistic of LN is positively significant. Therefore, we reject the null hypothesis and conclude that the LN has positively significant effect on ROAA.

Our estimation is similar to the findings of Short (1979), Smirlock (1985), Berger et al., (1987), Bourke (1989), Molyneux and Thornton (1992), Bikker and Hu (2002), Goddard et al., (2004), Kosmidou et al., (2006), and Flamini et al., (2009). They all found directly and indirectly positive relationship between bank size and bank profitability. On the other hand, this result is in contradiction with the results of Naceur (2003), Pasiouras and Kosmidou (2007), Ben Naceur and Goaid (2008), and Sufian and Habibullah (2009). They all found that bank size has a negative impact on profitability.

Finally, the operational expenses ratio has a positive significant relationship with profitability. The parameter of (OPEX) equals 32.3% and is significant at the 5% level when the dependent variable is ROAA, and equals 13.6% and is not significant when the dependent variable is ROAE. Consequently, when using ROAA as the dependent variable, table 5 indicates that the t-statistic of OPEX is positively significant. Therefore, we reject the null hypothesis and conclude that the OPEX has positively significant effect on ROAA.

This finding is similar to the results of Bourke (1989), Molyneux and Thornton (1992), Naceur (2003), and Kosmidou et al., (2006). They all found a positive relationship between efficient bank management and profitability. On the other hand, Amor et al., (2006), Pasiouras and Kosmidou (2007), Sufian and Habibullah (2009), and Dietrich and Wanzenried (2011) found lower overhead expenses improve profitability.



## 6 Conclusions

This study investigated the determinants of bank profitability in Syria. It used a sample of 17 banks during the year of 2004 and 2011, and utilized the GMM technique to test the hypotheses. The results found a positive and significant relationship between inflation rate and bank profitability measured by ROAE. In contrast, the study found negative and significant relationship between real gross domestic product growth rate and bank profitability. Moreover, the study found no evidence in support of the structure-conduct-performance hypothesis; hence, the concentration ratio had no impact on bank profitability. In addition, the study found no evidence that capital size affects banks profitability. However, the relationship between liquidity ratio and bank profitability measured by ROAA found to be negative and statistically significant. Similarly, the study found negative and significant relationship between credit risk and bank profitability. This implies that higher credit risk results in lower profits. The coefficient of this variable has the largest value comparing to other variables indicating that credit risk has the biggest impact on bank profitability. In addition, the results found a positive relationship between bank profitability and bank size. This concludes that increasing bank size will lead to increase in ROAA significantly and ultimately achieving economies of scale. Finally, the study found a positive relationship between banks profitability and management efficiency, and it was statistically significant when ROAA was utilized.

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