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Basel Accord and Lending Behavior:
Evidence from MENA Region

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Abstract

In 1988, an agreement was reached in Basel to set common requirements of bank capital in order to promote the soundness and stability of the international banking system. In line with the agreement, banks were required to hold capital in proportion to their perceived credit risks, which may have caused a "credit crunch," and a significant reduction in credit supply. We investigate the direct link between the implementation of the Basel Accord and lending activities using a data set of annual observations from 1989 to 2004 for banks in Egypt, Jordan, Lebanon, Morocco, and Tunisia. The results provide support evidence of a significant increase in credit growth following the implementation of capital regulations in general. Despite the higher capital adequacy ratio, banks expanded credit and assets. Credit growth appears to be driven by demand fluctuations attributed to real growth, cost of borrowing and exchange rate risk. Overall, the effects of macroeconomic variables, in contrast to capital adequacy, appear to be more dominant in determining credit growth, regardless of the capital adequacy ratio, and variation across banks by nationality, ownership, and listing.

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1. Introduction

In 1988, an agreement was reached in Basel to set a common requirement for banks' capital by 12 industrial countries. This is the Basel Accord. The Accord aimed at promoting the soundness and stability of the international banking system in response to the increased risk after the deregulation and globalization of financial systems, as well as the accumulation of bad loans in developing countries.

In response to the international agreement reached in Basel to standardize capital regulations, bank regulators have increasingly scrutinized the adequacy of bank capital, mandating that international banks operating in the major industrialized countries hold capital in proportion to their perceived credit risk. Risk-based capital may be viewed as a regulatory tax that is higher on assets in categories that are assigned higher risk weights. Therefore, it is expected that the implementation of the capital adequacy ratio imposed by the Basel Accord would encourage substitution out of high-risk assets, such as commercial loans, into less risky assets, such as government securities. Thus, risk-based capital adequacy may have caused a "credit crunch," resulting in a significant reduction in the supply of credit available to borrowers. The allocation of credit away from commercial loans may cause a significant reduction in macroeconomic activity.

This paper investigates the direct link between activities of bank regulators and bank lending behavior. Given concerns about the possibility of a credit crunch following the implementation of the Basel Accord, a survey by the Basel Committee on Banking Supervision (Bank for International Settlements (BIS), 1999) studied the evidence for Group of ten G-10 countries. Other studies (for example Pazarbasioglu (1997) on Finland; Ghosh and Ghosh (1999) on East Asia; Woo (1999) on Japan; Chiuri et al. (2002) on 16 emerging countries; Dionne and Harchaoui (2003) on Canada; Van Roy (2003) on G-10 countries; Konishi and Yasuda (2004) on Japan; Barajas, Chami, and Cosimano (2005) on Latin America; Berger and Udell (1994) and Peek and Rosengren (1995, 1997, 2000) on the U.S.) investigated the link between capital regulations and credit availability. The bulk of evidence supported demand contraction, rather than capital-based credit crunch.

We aim to investigate the impact of the adoption and implementation of the Basel Accord on credit availability using a sample of countries in the Middle East and North Africa (MENA) region. While the Basel Accord was originally negotiated among the developed countries, it has become a major component of banking regulations, setting uniform rules for regulating the amount of capital a bank must hold and defining risk-based minimum capital requirements throughout the world.

Provided there is a bank lending channel of monetary policy, reduction in bank credit brought about by capital requirements can constrain real investment opportunities and slow down real growth. Such potential macroeconomic effects would transmit bank capital requirements to macroeconomic performance and stability. Many MENA countries have adopted the Basel Accord, imposing minimum risk-based capital requirements on their banks. We have compiled a cross-country database on Basel adoption and aim to study the impact of capital regulation or risk-weighted capital ratio. Our sample includes Egypt, Jordan, Lebanon, Morocco, and Tunisia - quite a diversified sample of MENA countries that have taken serious steps towards implementing the Basel Accord and undertaking financial and banking reforms. [1]

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1 We excluded oil-producing countries as their assets growth is likely to be driven by fluctuations in oil price and oil production. In addition, Islamic Banks, which are rather different from commercial banks in terms of capital financing, are dominant in these countries. Other countries in the MENA region were excluded due to data constraints.

An increase in the risk-weighted capital ratio may amount to raising more capital, decreasing total assets, or shifting the composition of assets towards less risk. In light of the high cost of raising capital, the latter two options may be unavoidable. Accordingly, the implementation of the Basel Accord may establish a direct link between regulatory capital ratios, credit supply and, in turn, economic activity.

Excessive regulations may have adverse effects. On the one hand, they serve as prudential measures that mitigate the effects of economic crises on the stability of the banking system and subsequent accompanying macroeconomic results. On the other hand, as banks become more constrained, their ability to expand credit and contribute to economic growth will be hampered during normal times.

While most analysts would argue for the need to enforce regulations, one question comes to the forefront. What is the right benchmark to enforce regulations without jeopardizing the ability of banks to service the economy? To properly address this question, it has become necessary to thoroughly analyze the effect of capital regulations, namely the capital adequacy ratio.

The literature on this subject is growing. Nonetheless, its scope has been limited by data availability and methodological issues. Before embarking on our proposed research, we review the existing literature to identify the contribution of this paper's analysis. Combining the data set regarding the adoption of the Basel Accord, in addition to a data set spanning from 1989 to 2004 for banks drawn from Egypt, Jordan, Lebanon, Morocco and Tunisia, we examine the link between capital regulations and lending activity. We test for the impact of the capital adequacy ratio, independently and interactively with Basel regulations, on credit expansion in the selected MENA countries. The methodology follows the framework by Berger and Udell (1994) to test for a structural break regarding banks' loan supply following the adoption of Basel. In addition, we resort to the alternative framework by Peek and Rosengren (1995) to test the short-run impact of capital regulations.

Our results, consistent with the bulk of previous studies, indicate that the implementation of Basel did not slow down credit expansion, in general. The capital adequacy ratio is not an important factor in determining banks' ability to expand credit. The effect of the Basel Accord on credit expansion does not vary from the initial capital ratio at banks. More importantly, in consistency with previous studies, the capital adequacy ratio and enforcement of regulations increased equity along with credit and assets expansion in the countries under investigation. The effects of macroeconomic variables – real growth, the interest rate and exchange rate depreciation – appear more dominant in determining credit and demand growth.

The combined evidence indicates the importance of demand-side determinants of credit expansion in the countries under investigation. Given these determinants, policy priorities should focus on enhancing regulations and prudential measures that would streamline the supply of credit and reinforce the contribution of financial intermediation to economic growth.

In the next section, we summarize the existing literature on the relationship between capital constraints and credit availability. Section 3 provides some background on the banking sector in the countries under investigation. Section 4 describes the data set and methodology. In Section 5, we report the empirical results. Section 6 concludes and offers policy implications.

2. Literature Review

The (BIS 1999) carried out a survey of evidence on the effectiveness of the 1988 Basel Accord within the G-10 countries. The survey is concerned with two aspects. First is the implementation of bank capital requirements, for example whether banks fulfill the capital requirements by increasing capital or by altering the risk-weighted assets. Second is the impact of bank capital requirements on lending activity.

The literature begins with Shrieves and Dahl (1992) who used several periods of cross-section data on commercial banks in the U.S. They found the risk-based capital standard to be effective provided that the standard reflects the true risk exposure of banks.

In another direction, the evidence of Calen and Rob (1996) and Jacques and Nigro (1997) confirmed the effectiveness of the Basel Accord on risk allocation in banks' portfolio. Using a sample of U.S. banks in the periods 1984-1993 and 1990-1991, the authors found that capital regulation had a significant impact on the share of risky assets in banks' balance sheets. They concluded that higher capital requirements could lead to an increase of portfolio risk.

Aggarwal and Jacques (1998) employed a cross-sectional sample of U.S. banks in 1991, 1992, and 1993. They specifically examined the impact on bank behavior of the 1991 banking legislation. Undercapitalized banks increased their capital target ratios more quickly than other banks with higher initial capital.

Another group of studies analyzed the impact of capital requirements using a sample of banks in other industrial countries. Ediz, Michael, and Perraudin (1998) found the regulation effective in the U.K. More precisely, they reported evidence that banks in the U.K. attempted to boost their capital in order to meet the capital requirements. Rime (2001) confirmed this finding using data for Swiss banks. Nonetheless, banks' risk-taking did not appear to vary significantly as a result of enforcing capital requirements.

In contrast to the evidence of Rime (2001), some studies reported evidence that higher capital standards led to a greater risk assumption and higher probability of failure. For example, Koehn and Santomero (1980) and Kim and Santomero (1988) showed that capital requirements resulted in changes in the composition of the risky part of the bank's portfolio in such a way that risk was increased and the probability of failure became higher. The implication, as emphasized by Blum (1999), is that capital regulation did not prohibit banks from undertaking a higher degree of risk, in consistency with a moral hazard problem. As further analyzed in Marshall and Prescott (2000) and Vlaar (2000), capital requirements were perceived as a burden among inefficient banks. In contrast, efficient banks might seek more opportunities to maximize profitability in light of higher capital requirements.

The second strand of the literature, along the lines of our investigation, tested the impact of capital requirements on credit expansion. The implication of higher capital requirement is that banks are forced to contract loan supply, resulting in a credit crunch. The theoretical underpinnings for this argument are articulated in Bernanke and Gertler (1995). Tightening regulations may impose additional constraints on banks' ability to acquire external funds, implying that changes in the interest rate may not be an adequate proxy for changes in the cost of funding. If banks are unable to comply with the higher capital requirement, they opt to shrink credit supply instead (see for example Myers and Majluf (1984)). Holmstrom and Tirole (1997) demonstrated that the capital ratio behaved pro-cyclically, increasing during expansion and decreasing during contraction. There is a strong relationship between banks' assets and liabilities (see for example Diamond and Rajan (2000)). Deposits increase during expansion, along with banks' credit, resulting in an increase in the capital adequacy ratio.

Using U.S. data, Bernanke and Lown (1991) demonstrated that loan growth at individual banks during the recession of 1991-1992 was positively linked to initial capital ratios. As analyzed by Peek and Rosengren (1995), credit crunch could be attributed to capital crunch. The former indicates that loan supply falls relative to loan demand. Capital crunch defines bank shrinkage resulting from binding capital requirements. While capital crunch could lead to credit crunch, a number of other factors may contribute to the latter, independently of capital crunch. Banks that cannot meet or satisfy the international Basel Accord may resort to credit crunch to reduce their risky assets in line with the capital adequacy ratio.

Berger and Udell (1994) investigated the impact of risk-based capital adequacy on credit crunch in the United States. They took a close look at micro-bank level data to examine how bank portfolios changed in the early 1990s from the 1980s and to see how these changes were related to risk-based capital ratios and other key variables. The null-hypothesis was a reduction in loans and a shift into less risk-based assets in response to the implementation of a higher capital adequacy. Moreover, they examined the "lending view" of monetary policy transmission by scrutinizing the link between the allocation of credit through bank loans and the performance of the economy as a whole. They accounted for macroeconomic and regional variables in order to control for fluctuations in demand for credit and isolate supply-driven credit shift. They ran the model separately for a number of sub-samples based on bank size and capital ratios. Their findings indicated that the credit crunch hypothesis fared the worst of all the alternative explanations of the banks' credit reallocation of the 1990s. Almost all of the lending and securities categories declined substantially in the early 1990s owing to macro/regional effects.

In contrast, Peek and Rosengren (1995 a, b) concluded that there was considerable evidence, at least for New England, that lower loan demand and a capital-crunch-induced decline in loan supply, both together, brought about a decline in lending. Brinkmann and Horvitz (1995) also found evidence of significant loan supply responses to the Basel capital requirements.

Furlong (1992), Haubrich and Wachtel (1993), and Lown and Peristiani (1996) also concluded that capital regulation contributed to a decrease in lending which helped fuel a post-capital-requirements US credit crunch. Wagster (1999) reached the same conclusion for Canada and the United Kingdom. He failed to find support, however, for this result in the cases of Germany, Japan, and the United States, where he concluded that a number of factors played a role in generating a credit crunch. Using US data, Furfine (2000) showed a robust correlation between the shocks to bank capital and a fall in lending. Furfine (2001) concluded that while capital regulation does matter, toughened supervisory scrutiny had a larger influence on banks' balance-sheet choices in the early-1990s US credit crunch.

Similarly, Kim and Moreno (1994) found that the regulatory environment forced banks in Japan to pay more attention to their capital positions, resulting in a slowdown in the growth of lending. Ito and Sasaki (1998) provided evidence that individual Japanese banks with lower capital ratios had a tendency to reduce lending. Using Japanese banking data, Woo (1999) found evidence that supports the effect of capital crunch on lending growth in the early nineties. Honda (2002) found that international capital standards reduced credit expansion in Japan slightly more than domestic regulations.

Watanabe (2004) analyzed the impact of prudential regulation in slowing down credit expansion, countering the effectiveness of monetary policy in stimulating economic conditions in Japan. Stagnation in Japan persisted during the last decade despite monetary easing, as evident by "zero interest rate policy" since February 1999, which proved to be ineffective. A number of macroeconomic factors, including expectations of deflation, may have countered the effectiveness of monetary policy. Nonetheless, some economists argue that the "credit crunch" is an important determinant. The capital crunch is, by definition,

regulatory driven. Regression results suggest that the severest "capital crunch" occurred in FY 1997. The reduction in bank capital impacted adversely on lending policy, resulting in a "credit crunch." Moreover, the bank lending channel of monetary policy transmission was severely damaged in FY 1997 by the credit crunch.

Montgomery (2005) investigated the hypothesis that the capital adequacy ratio, introduced under the Basel Accord, caused Japanese banks to shift their portfolios away from heavily weighted risk, such as loans and corporate bonds, into less risky assets, such as government bonds. Using a panel of Japanese bank balance sheets, for fiscal years 1982-1999, the study found that neither international nor domestic asset portfolios were strongly affected by the total regulatory capital ratio.

Specific emerging country studies included research devoted to finding evidence of a credit crunch in Indonesia. Ghosh and Ghosh (1999) found that as the banking system crisis deepened in Indonesia, the supply of real credit declined. The second is the paper by Agung, Kumiarso, Pramono, Hutapea, Prasmuko, and Prastowo (2001) which shows the existence of a credit crunch after the crisis in Indonesia, 1997-1999. Moreover, bank credit was found to decelerate in response to capital shocks. More specifically, the Basel Accord had a negative effect on credit supply by Indonesian banks, resulting in a credit crunch.

The relationship between capital adequacy and credit expansion was further analyzed in the context of emerging countries. Using a sample of 16 emerging countries, Chiuri, Ferri and Majnoni (2001) found evidence that the introduction of higher minimum bank capital requirements may induce an aggregate slow down of bank credit. Barajas and Steiner (2002) looked at eight Latin American cases, estimating separate supply and demand functions, to determine the most probable causes for their credit situation. To accommodate regulations of Basel I, banks followed several options: increase capital, decrease total assets, or shift the composition of assets towards those that are less risky.

Chiuri, Ferri and Majnoni (2002) extended the approach of Peek and Rosengren (1995) to examine a panel of data for 572 banks in 15 developing countries. They found consistent evidence that the imposition of capital regulation induced a reduction in loan supply and hence, in total lending.

Not all researchers agree that capital regulation has had significant effects on bank lending. Jackson *et al.* (1999) reviewed a number of prior studies investigating how capital adequacy regulations influenced actual capital ratios; such as Peltzman (1970), Mingo (1975), Dietrich and James (1983), Shrieves and Dahl (1992), Keeley (1988), Jacques and Nigro (1997), Aggarwal and Jacques (1997), Hancock and Wilcox (1994), Rime (2001), and Wall and Peterson (1987, 1995). Jackson *et al.*'s conclusion was that, in the near term, banks mainly respond to toughened capital requirements by reducing lending and that there is little conclusive evidence that capital regulation has induced banks to maintain higher capital-to-asset ratios than they otherwise would choose if unregulated. Likewise, Ashcraft (2001) found little evidence that capital regulation during the 1980s materially influenced bank capital ratios. Flannery and Rangan (2004) found some influence of capital regulation on actual bank capital ratios.

Barrios and Blanco (2003) analyzed response to market forces versus capital constraints using data for Spanish commercial banks between 1985 and 1991. They found that banks were unconstrained by capital regulation during the period of study. Beatty and Gron (2001) found similar results to those of Barrios and Blanco using data for 438 publicly traded US holding companies between 1986 and 1995.

Barajas, Chami, and Cosimano (2005) analyzed the impact of the Basel Accord on credit slowdown in Latin America. They used a new data set on Basel I adoption in addition to a

bank data set spanning 2,893 banks drawn from over 150 countries to examine whether Basel I caused banks to reduce their lending activities. They tested this hypothesis on a global level and for the Latin American region in particular. Their results showed that the Basel Accord was associated with an average increase in capital and lending activities in Latin America as well as throughout the world. They found little evidence to support that either the loan-asset ratio or the average growth rates of loans declined after Basel I adoption. Overall, their results gave only a weak evidence of a Basel-induced credit crunch in Latin America, ruling out the hypothesis that the loan supply curve shifted leftward after Basel. Hence, risk-based capital requirements have not been responsible for a widespread reduction in credit supply in Latin America.

Our paper builds on these efforts with the aim to test the effect of capital regulations on credit expansion. We specifically test the effects of enforcing capital requirements on credit growth by considering short and long-run effects on assets and credit growth. The aim is to uncover evidence that provides answers to the following questions: (i) Is there any evidence of an increase in banks' capitalization in the wake of enforcing the requirements of the Basel Accord, and (ii) what are the consequences on equity assets and the composition of risk in the assets portfolio?

3. Banking Sector Developments and Regulations

This section provides an overview of major highlights characterizing the banking sector in the five MENA countries under investigation. Table 1 provides an overview of major banking indicators across countries.

Egypt

The Egyptian banking sector expanded markedly in the mid-1970s (for details, see El-Shazly (2006)), spurred by the shift in economic management towards an open-door policy. This policy supported outward-looking growth with an active role for the private sector in economic management. To achieve these objectives, a banking law was enacted in 1975 (Law 120/1975) defining the nature and mode of operations for all banks. In the 1990s, the Egyptian authorities undertook major banking reforms towards a more liberal system. This included the strengthening of bank supervision and regulations on the basis of internationally accepted standards to deal with the risk inherent in the new policy environment. As the banking sector is a major component of the Egyptian financial sector, the Central Bank of Egypt (CBE) viewed the soundness of such sector to be of paramount importance to ensure full utilization of the sector's resources towards reviving economic activity and sustaining a high growth level.

The Egyptian banking sector comprises 57 banks, 28 commercial banks of which 4 banks are state-owned, 26 investment banks of which 11 are joint venture banks and 15 are branches of foreign banks, in addition to 3 specialized banks of which two are state-owned. The number of licensed branches for these banks in Egypt reached 2443.

The banking industry in Egypt is, therefore, concentrated and segmented, which weakens competition. The rapid growth of the banking sector during the 1990s, together with the liberalization of the whole economy added extra burden on the Central Bank of Egypt as the sole regulator of the banking industry. Recently, in an attempt to reduce market concentration and enhance competition, the authorities have implemented a bank privatization program. Public banks are mandated to divest their shares in the joint venture banks with a maximum ownership of 20 percent.

Banks are supervised by the Banking Control Department of the CBE and, in practice, supervision is strong. The CBE has made considerable progress in developing its supervisory framework and staff using materials, procedures and techniques obtained from other countries' supervisory systems. According to the Financial Sector Assessment Paper FSAP of 2002,[2] the CBE complied with most of the Basel Core Principles for Effective Banking Supervision. To reinforce the supervisory role, the government and the CBE drafted a new Central Bank and Banking Sector Law to increase the degree of independence of the CBE in maintaining price stability.

Since the end of the first FSAP in June 2002, a number of legislations targeted additional reform. A new law was enacted in July 2003 to establish the independence of the CBE. In line with the recommendations of the FSAP report, modifications and amendments for the CBE prudent rules and regulations have been introduced. All banking supervision arrangements have been comprehensively documented in the second half of 2202. New regulations regarding connected and related party lending have been enforced since November 2002. By the end of March 2003, the majority of banks had complied with the new minimum capital adequacy ratio of 10 percent and an additional capital injection to all state-owned banks was implemented. Provisioning levels for classified loans are monitored very closely. Other supervision and prudential regulations include: increasing the minimum paid-up capital of banks, increasing efficiency of the off-sight supervision of the CBE's Supervision Department and preparing banks for the introduction of the Basel II regulations.

Jordan

Macroeconomic conditions have been conducive to financial stability, with external developments partially posing the greatest potential risk to financial stability.[3] Jordan's financial system is dominated by the banking system, which has provided a high level of intermediation. Most banks are well capitalized, liquid, profitable, and can withstand considerable shock, but non-performing loans are generally high and there is a higher concentration in bank deposits and loans.

A recent Financial Sector Stability Assessment (FSSA) reports that the banking system generally shows high capital ratios, liquidity and profitability. There are four undercapitalized banks left after the restructuring of one bank in 2004 but plans are underway to restructure. Banking supervision has been strengthened and most prudential standards are in line with international best practice. The Financial Sector Assessment Paper (FSAP) also highlighted that the Jordanian banking system is vulnerable to geopolitical shocks.

Lebanon

The financial sector is bank-focused and generally acknowledged to be exceptionally large and relatively stable.[4] As of February 2004, the sector consisted of 53 commercial banks, 10 specialized medium and long-term credit banks, 28 financial institutions, eight financial intermediaries and three leasing companies. Foreign banks were also well represented. The financial intermediation level, equivalent to around 240-250% of GDP, reflects the large size of the banking sector.

Banks' profitability fell with the reduction in banks' holdings of T bills. Non-performing loans are of concern especially in light of the relatively low provisioning level. Identified

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2 IMF, FSAP main report, December 2002.

3 For details, see Jordan, IMF Staff Report for the 2005 Article IV Consultation.

4 For details, see Commission Staff Working Paper (2005)

weaknesses in banking prudential supervision have been remedied through an overhaul of prudential regulation. Tighter controls on money laundering were implemented. The Central Bank supervises and regulates the banking system. The Banking Control Commission performs its supervisory functions as an independent body, with a separate budget. The Higher Banking Council (HBC) assumes the role of a supreme banking court, the decisions and rulings of which are final, including the imposition of sanctions on banks and financial institutions that violate banking regulations.

Starting in March 1995, commercial banks were required to meet a minimum capital adequacy ratio of 8% in line with the Basel Accord. Banks' capital increased substantially since, and by the end of 2001 the average capital adequacy ratio of commercial banks was approximately 16.8%. Banks are obliged to draw up financial statements and auditors must publish a consolidated and checked annual statement of bank accounts.

Morocco

The country's credit institutions comprise 21 banks (12 commercial banks, 4 specialized banks, 4 subsidiaries, and 1 branch of a foreign bank) in addition to 70 finance companies.[5] The commercial banks account for 78 % of the non-consolidated assets of the banking system, while the specialized banks have 22 % of these assets. The credit institution is governed by the Banking Law of July 1993, which eliminated the distinction between commercial banks and specialized financial agencies. That law also unifies the legal framework and supervisory regime for all credit institutions. Foreign capital plays a significant role in Moroccan banks – approximately 21 % of banking sector assets. As in many countries, the banking sector in Morocco dominates the financial system. Nonetheless, the size of the banking system and its market penetration remain relatively modest by regional and international standards.

Recent banking activity in Morocco has been marked by a gradual but sustained liberalization that in turn has been accompanied by new prudential regulations in line with international standards. As the state's presence in the banking sector decreased to 30 % of total bank assets, credit to the private sector expanded significantly – approximately from 25 to 48 percent.

Over the last ten years, the Moroc can government, with the assistance of the World Bank has supported the development of Morocco's financial system through a series of operations covering the banking system. Main reforms implemented during this period include the elimination of credit ceilings, interest rate liberalization, the adoption of a new banking law in 1993, the gradual elimination of monetary holdings of government securities and the strengthening of prudential regulations of banks in accordance with international standards. As a result of these reforms, the financial sector is increasingly operating in accordance with market rules, and financial intermediation activity has intensified.

Overall, the financial status of commercial banks is healthy and has clearly improved since 1993. Net earnings of the country's banking system are well above international levels and returns on assets and equity compare very favorably with these of banks elsewhere. Specialized banks represent the weakest segment of the banking sector. They account for 50 % of total loans in arrears, but have failed to keep in pace with the rest of the banking sector in terms of earnings and asset quality. The banks' foreign exchange risk exposure is currently limited and well below potential limit. Currently, the quality of loan portfolio, net of provision, does not threaten the capital adequacy of commercial banks. The banking system

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5 For details, see World Bank (2000).

has a relatively adequate capital base, consisting of Tier 1 capital and yielding an average capital adequacy ratio of 12 percent.

Tunisia

A recent Financial Sector Assessment Paper for Tunisia indicates that the existing amount of non-performing loans (NPLs) does not constitute a significant threat to macroeconomic stability.[6] However, it represents a source of inefficiency and distortion in the banking system, which needs to be addressed. Public banks hold more than half of all NPLs and continue to weigh disproportionately on the system. Provisioning is low because of over reliance on collateral, although realization of collateral is difficult. Tunisia has made progress in implementing the FSAP/FSSA recommendations, particularly in the area of restructuring the banking sector.

Banking sector performance has strengthened under the impetus of public bank restructuring and tighter prudential controls and supervision. All major indicators of bank soundness have improved. The capital asset ratio for the commercial banking sector as a whole rose to 10.1 % in 1999, with only one small bank still failing to reach the minimum 8 % ratio, and the level of un-provisioned bad loans was brought down to 14.1 % of net liabilities from 18.4 % in 1997. This ratio declined over time as a result of tighter supervision, measures taken to facilitate provisioning, write offs and the establishment of loan recovery agencies.

The credit culture would have to be strengthened more if the risks of accumulating new bad loans are to be contained. While strong growth prospects should reduce credit risk, the restructuring of resource allocation associated with trade liberalization could generate new pressures on banks' loan portfolios. Given the large role still played by public banks (60 % of total banking sector assets) and the need to upgrade banks' risk, urgent practices are needed to conform to the requirements of a more open economy.

3. Methodology

Previous research has investigated the link between bank capital regulation, the loss of bank capital and bank shrinkage, commonly referred to as capital crunch (Bernanke and Lown, 1991; Furlong, 1992; Hancock and Wilcox, 1992; Bizer, 1993; Cantor and Wenninger, 1993; Haubrich and Wachtel, 1993; Baer and McElravey, 1994; Berger and Udell, 1994; Hancock et al., 1995; Peek and Rosengren, 1995). Most studies have attributed the capital crunch to the large losses in bank capital in combination with the adoption of new capital standards.

To establish whether regulatory enforcement actions have contributed to a credit crunch, we constructed a pooled annual time-series and cross-section panel of banks' balance sheets in five MENA countries: Egypt, Jordan, Lebanon, Morocco, and Tunisia. Most previous studies of credit crunches have focused on gross changes in bank assets and banks loans (for example, Bernanke and Lown, 1991, Hancock and Wilcox, 1992; and Peek and Rosengren 1994). Our analysis will employ three measures of bank indicators: real change in total assets, net loans over total assets and banks' holdings of government securities over total assets.

The empirical analysis proceeds by investigating the determinants of the differences behaviors adopted by banks with regards to their asset portfolio behavior. We do not assume that the credit crunch occurred, but allow that a crunch may have occurred during an interval that includes most of the phase-in period for risk-based capital according to Basel regulations. Our data comprise the sample period 1989-2003. The date of implementation of the capital

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[6] For details, see Tunisia, Staff Report for the 2005 Article IV Consultation, IMF.

adequacy requirement varied across countries as follows: Egypt (1997), Jordan (1992), Lebanon (1995), Morocco (1996), and Tunisia (1999).[7]

It is necessary to have a control period since a credit crunch is defined as a decline in credit availability or a leftward shift in the supply curve for loans relative to normal times. Our relatively long control period allows us to test for secular lending patterns. In addition, we test the impact of fluctuations in the demand for credit on lending patterns.

Our definition of a crunch is the change in loan supply relative to a benchmark. Much of the previous research showed that during credit crunch periods banks with low leverage capital ratio tended to lend less than banks with high capital ratios. Nonetheless, a test of a "credit crunch" would require a significant reduction in credit supply.

The dependent variables in our analysis are the real growth rates of several banking indicators or end of year ratio indicators. We use real growth rates of the asset stocks as proxies for flows of new investments. In addition, we are interested in the growth rates of loans which may be indicative of a credit crunch. An increase (decrease) in loans is likely to be highly correlated with banks' deposits. Furthermore, we study the impact of the capital adequacy ratio on banks' management of risk in their portfolio, in light of regulatory requirements and the degree of risk they face. To verify, we examine the change in banks' holdings of government securities as a result of the implementation of Basel regulations.

We will test for a significant reduction in lending and total assets, or a change in the composition of assets following the implementation of the Basel Accord, and/or an increase of equity. If the voluntary risk-retrenchment hypothesis is correct and banks chose to reduce their risks, then they would likely cut back loan growth in favor of more government securities holdings. Many bank loans to small businesses require the comparative advantage and/or scale economies of a bank associated with information production (see Diamond, 1984). If banks reduce the supply of credit, many small borrowers may be unable to obtain financing because of the loss of information obtained through the bank-borrower relationship. Moreover, according to the "lending view" of the transmission channel of monetary policy, a reduction in credit allocation through bank loans would exacerbate economic slowdown and reduce the effectiveness of monetary policy (see for example Bernanke and Blinder (1988, 1992); Romer and Romer (1990); Gertler and Gilchrist (1991, 1993)).

The analysis proceeds systematically by exploring how and why bank lending and capital characteristics differ between the credit crunch and control periods. We first see if there was in fact a change in means experienced by bank lending and capital between the pre and post-Basel periods using the simple regression:

$$D_{ijt} = \boldsymbol{a}_0 + \boldsymbol{a}_1 \text{Post-Basel-R.P}_{jt} + \boldsymbol{a}_2 X_t + \boldsymbol{e}_{jt} \tag{1}$$

D in Model (1) represents each of the dependent variables: the real growth of total assets (*RGTA*), the ratio of government securities over total assets (*GOVSEC*) and total capital ratio (*TCAPR*) and the loan-asset ratio (*LAR*). *Post-Basel-RP* is a dummy variable that equals 1 for each year after the implementation of the Basel Accord in the specific bank *j* and 0 before that. The *X* variables in equation (1) include macroeconomic variables to account for the demand-side hypothesis. More specifically, they include macroeconomic variables that could influence bank lending behavior. Our analysis incorporates three such variables: real GDP

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7 The sample of countries includes the most advanced countries in financial reforms and bank regulations. Algeria, Mauritania and Libya are excluded because there is no sufficient number of banks (less than five banks in the data base). For Turkey, the data of Basel Accord adoption, 1992, did not facilitate an analysis over the sample period, 1999-2004. For the GCC countries, mainstream banks are Islamic and the economy is undiversified outside the oil sector, which would bias the results regarding credit expansion.

growth per capita (*Growth in GDP*), differential between loan and deposit interest rates (Interest rate), and the exchange rate (*Loc. Cur/USD*), measured by the price of the U.S. dollar in terms of domestic currency. Credit growth is likely to pick up during periods of economic boom that are consistent with high real growth. In contrast, exchange rate depreciation may slow down credit expansion. A depreciation of the exchange rate would increase the risk of lending in domestic currency given outstanding foreign liabilities; and $e_{j,t}$ is a mean-zero random error, which is serially uncorrelated and orthogonal to information available at time t-1.

In order to test whether loan supply contracted as a result of the Basel Accord, we used the Berger and Udell (1994) approach with some adjustment to specifically fit our sample composition. The analysis proceeds by exploring how and why bank loan growth rates differ between the pre and post-Basel period. Bank loans were assumed to react to lagged measures of perceived risks; banks with high level of risk (for instance, low total capital ratio) would have a lower level of loan on average than less capitalized banks. This is related to the "risk retrenchment hypothesis" defined by Berger and Udell.

$$\text{LAR}_{ijt} = a_0 + a_1 \text{Post - Basel - R.P}_{jt} + a_2 \text{TCAPR}_{jt} + a_3 \text{Post - Basel - R.P}_{jt} \cdot \text{TCAPR}_{jt}$$
$$+ a_2 \text{X}_t + e_{jt} \tag{2}$$

The dependent variable *LAR* is the loan-asset ratio. *TCAPR* is total capital ratio in which we include three macroeconomic variables - real GDP growth per capita, differential between loan and deposit interest rates and the exchange rate - to capture change in loan demand.

A negative a_1 coefficient would indicate that banks decreased their loans after Basel Accord regardless of their risk. If bank loans react negatively to a prior increase in risk (decrease of total capital ratio), we expect the coefficient on the risk factor a_2 to be positive. The effect of the Basel Accord on risk sensitivity will be assessed by the coefficient a_3 on the interaction term between Post-Basel RP and the TCAPR variables. If banks experienced risk retrenchment as a result of the Basel Accord, then a_3 should be positive.

To establish robustness, we utilize the Peek and Rosengren (1995b) approach, but with some adjustment specifically tailored to our case. We explicitly take into account the international and inter-temporal dimensions of our sample by using panel analysis and by introducing control variables to account for macroeconomic effects. Peek and Rosenberg did not include any macroeconomic variables as the sample collected only covered New England banks. Following Peek and Rosenberg, we estimate the following equation:

$$\text{RGLoans}_{ijt} = a_0 + a_1 \text{lagEq/Ta}_{jt} + \left(a_2 + a_3 \text{lagEq/Ta}_{jt}\right) diffeq_{jt} + a_4 logA_{jt} + a_5 \text{X}_t + e_{jt} \tag{3}$$

The dependent variable of equation (3) is the change in real net loans normalized by the beginning of the year capital of total assets to reduce the potential heteroskedasticity problems with the error term. Banks with capital to assets ratio below the required minimum are expected to have a sluggish growth in lending than better capitalized banks. To test this effect, equation 3 includes the lagged total capital ratio (*lagEq/Ta*), with a_1 and a_2 are expected to be positive. The a_2 coefficient captures the effects of changes in bank lending to changes in equity and is predicted to be positive in support of the capital crunch hypothesis. According to Peek and Rosengren (1995b) and Chiuri et al. (2002), we would anticipate the effect of the change in capital to be smaller for banks which have higher capitalization. So we expect the estimates of the a_3 parameter to be negative proving that the effect of change in capital (*diffeq*) is smaller when the beginning of the year total capital ratio is high – providing that potential demand side shocks are controlled by the logarithm of total assets (*logA*) and the vector of macro-variables *X*.

4. Empirical Evidence and Analysis

Before we estimate the empirical models (1) and (2), we provide a diagnosis analysis of the series under consideration. Relevant statistics are summarized in Tables 1 and 2.

Across all five countries, the average real growth of loans was higher in the pre-Basel period. Despite the capital adequacy regulation, the rate of growth of equity was higher, on average, pre-Basel I. Higher growth of equity contributed to faster growth in loans and banks' holdings of government securities, on average. Nonetheless, the average growth of total assets was slightly higher post-Basel I, implying a higher degree of diversification in banks' portfolios. The qualitative evidence remains robust in general, using banks data in Egypt and Lebanon.

In Jordan, there was a significant increase in equity growth post-Basel I. Banks' total assets grew, on average, at a higher rate post-Basel I, which appears to be directly driven by higher growth of banks' holdings of government securities.

Despite a reduction in the average growth of equity across banks of Morocco and Tunisia, banks experienced a surge in average real growth of total assets – particularly holdings of government securities.

Overall, descriptive statistics provide mixed evidence concerning the impact of capital regulations on the growth of equity, banks' assets and their composition across the countries under investigation.

Using end of period ratios, the evidence appears stronger regarding the effect of higher capital adequacy ratio in accelerating the growth of banks' equity and their holdings of government securities relative to total assets. However, the evidence suggests higher loans to assets ratio post-Basel I in most countries in general.

Growth in Banks' Assets Post-Basel I

Table 3 presents the results of estimating the empirical model in (1). The positive and significant coefficient of the dummy variable indicates significant growth in banks' total assets post-Basel I in Egypt and Morocco and in a sample of all countries.

The effects of macroeconomic variables appear more dominant in the growth of assets. The positive and significant coefficients indicate the dominant effect of the demand channel in accelerating credit growth. This evidence is robust in Egypt, Lebanon, Morocco, Tunisia and a sample of all countries

Currency depreciation slows down credit expansion in Lebanon, Morocco and a sample of all countries. In contrast, currency depreciation stimulates export growth and demand for credit in Tunisia.

Higher cost of lending depresses demand for credit and slows down assets expansion in Lebanon. In contrast, the differential margin between lending and deposit rates usually widens with credit boom and, therefore, coincides with significant expansion in banks' assets in Jordan.

Growth in Banks' Equity Post-Basel I

Table 4 illustrates the results of estimating the empirical model in (1) using data for the ratio of banks' equity to total assets as the dependent variable. This ratio increased significantly post-Basel I in Lebanon, Morocco, Tunisia, and a sample of all countries.

Effects of the demand-side factors appear less robust. Higher real growth stimulates demand for credit and, in turn, a higher capital adequacy ratio in Morocco. In contrast, higher interest rate and currency depreciation depress demand for credit and decrease the capital adequacy ratio.

Growth in Banks' Holdings of Government Securities Post-Basel I

Table 5 illustrates the results of estimating the empirical model in (1) using data for banks' holdings of government securities as the dependent variable. The evidence is not robust regarding the effect of Basel on banks' holdings of government securities. The evidence in Jordan and a sample of all countries indicates a significant reduction in banks' holdings of government securities post-Basel I. In contrast, these holdings increased in Lebanon post-Basel I, which maybe specific to the high government debt and excess liquidity in the banking system driven by migrants' flows.

Currency depreciation increases the risk of investment in domestic currency, decreasing banks' holdings of government securities. This evidence is robust in Jordan, Lebanon, and a sample of all countries.

In contrast, a widening margin between the lending and deposit interest rates decreases demand for loans and increases banks' holdings of government securities. This evidence is significant in Egypt and Jordan.

In general, the combined evidence supports significant increase in equity that resulted in significant increases in banks' total assets and holdings of government securities post-Basel I.

Developments in Net Loans to Assets Ratio Post-Basel I

Table 6 presents the results of estimating the empirical model in (2) using the net loans to total assets ratio as the dependent variable. The positive and significant coefficient on the dummy variable for Basel I indicates an increase in this ratio in Lebanon, Morocco, Tunisia, and a sample of all countries, independently of the level of risk at banks.

The interactive dummy tests variation in net loans to assets ratio post-Basel I based on the level of risks at banks. The negative and significant coefficient indicates a reduction in net loans ratio, the higher the initial capital relative to assets, in Morocco, Tunisia, and all countries. Banks with lower capital ratio post-Basel I were able to expand net loans, in contrast to the risk retrenchment hypothesis.

The positive and significant effect of real growth on net loans to assets ratio is evident only for Egypt. In contrast, real growth decreases net loans to assets ratio in Lebanon, Tunisia and a sample of all countries. In these cases, higher growth provides better opportunities to diversify banks' portfolio and decreases the net loan to assets ratio in the banking system.

A widening differential between the lending and borrowing rates has a negative and significant effect decreasing the net loans to assets ratio in Egypt and Jordan. The higher cost of borrowing has a negative effect on the demand for credit, and therefore shrinks loans to assets ratio.

Growth in Net Loans with the Level of Risk Post-Basel I

Table 7 presents the results of estimating the empirical model (3) using the growth rate of net loans in the banking system as the dependent variable. The positive and significant coefficient on the lagged capital adequacy ratio supports significant increase in net loan growth with equity in Egypt, Lebanon, Morocco and a sample of all countries. The

coefficient on the change in equity provides mixed evidence. Higher growth of equity contributes to a higher growth of net loans in Egypt and Lebanon. In contrast, the growth in net loans decreases despite higher equity growth in Jordan. In the latter case, demand-side factors may have had a more dominant effect on the growth of net loans.

The coefficient on the interactive term captures variation in the growth of loans with the capital adequacy ratio, conditional on the rate of growth in equity across banks. The coefficient is positive and significant in Jordan and a sample of all countries. In contrast to the risk retrenchment hypothesis, the effect of the change in capital on the growth of net loans is high, despite a high level of initial capital ratio across banks.

Robustness and More Detailed Evidence

Tables 8, 9 and 10 provide results that distinguish the evidence based on banks' nationality, status, and ownership.

In Table 8, the evidence supports significant increase in total assets, equity and net loans post-Basel I for both national and international banks. However, the evidence provides a sharp contrast with regards to banks' holdings of government securities. While national banks opted to increase their holdings post-Basel I, international banks decreased these holdings. The difference indicates more options for international banks to diversify their portfolio and reduce risk.

In Table 9, the impact of Basel Accord is positive and significant on the growth of total assets, equity and net loans, regardless of the status of quotation (listed or unlisted). In contrast, both types of banks held less government securities post-Basel I. The evidence discounts the importance of capital regulations on banks' decisions to hold less risky assets in their portfolio.

In Table 10, the evidence is robust regarding the effect of Basel I in stimulating the growth of banks' total assets, equity and net loans, regardless of ownership. Both private and state-owned banks opted to hold less government securities, disputing claims that have argued for a more risk-averse investment strategy post-Basel I.

5. Summary and Conclusion

The analysis of this paper has considered the effect of enforcing the capital adequacy requirement on credit expansion across a sample of MENA countries that includes Egypt, Jordan, Lebanon, Morocco and Tunisia. Three banking indicators are under consideration, total assets, net loans and holdings of government securities. Enforcing more stringent capital regulations may have forced banks to shrink credit expansion to abide by the necessary requirement, in the absence of measures to increase capital in the short-run.

We study the effects of enforcing capital requirements using three empirical models. The first model measures the effect of capital regulation on growth of total assets, loans and equity. The second model combines capital regulations with risk measures, such as the capital adequacy ratio, to study their independent effects as well as their interactive effect on credit expansion. Moreover, the model controls for the effect of macroeconomic variables, namely real GDP growth, the interest rate differential between lending and deposit ratios, and the exchange rate relative to the dollar. The demand for credit is likely to increase in conjunction with higher real GDP growth, indicating a boost in economic activity. Higher interest rate differential increases the cost of investment, slowing down credit growth. Exchange rate depreciation increases banks' risk of lending in domestic currency, given their outstanding foreign obligations.

The results, in general, support an increase in growth of banks' equity post-Basel I. Nonetheless, the evidence does not support the effect of the capital adequacy regulation in slowing down credit expansion. With the exception of Lebanon, the growth of banks' assets increased post-Basel I. Furthermore, the evidence in general does not support a deliberate effort to increase banks' holdings of government securities to mitigate risk and abide by capital regulations.

In addition, the evidence in general supports a stronger role for demand-side determinants of credit expansion, compared with supply-side factors in the sample of MENA countries under consideration. This evidence supports the findings of previous studies, illustrating that credit expansion in MENA countries is highly dependent on macroeconomic fundamentals and less dependent on micro foundations and supply constraints in the financial system. Credit expansion, despite capital regulations, warrants a careful assessment of prudential regulations and provisional measures to reduce the risk of imbalances in the banking system. A thorough evaluation of the determinants of banking performance and credit supply is necessary. Prudential measures should be established to hedge against risk and increase the resilience of the banking system in the face of macro and micro-economic shocks.

Credit expansion is a key ingredient of the monetary policy's transmission channel Absent prudential regulations and fast growth of credit could exacerbate the adverse effects of negative shocks on the banking system and consequently spillover effects on the economy. As far as policy implications are concerned, this paper's findings support appeals to enforce prudential regulations and monitor banks' performance – to strengthen the intermediation function and reduce the risk of financial vulnerability. In the absence of such regulations, financial risk could have devastating effects on the stability of the banking system that could turn into an economy-wide financial crisis, as recent experiences have demonstrated.

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Table 1: Sample Period and Number of Observations per Country [1]

Country	Sample Period	No. of Years	No. of Banks	Sample Representation Ratio (%)	Average Size in USD bllion	No. of Banks per Nationality		No. of Banks by Listing Status		No. of Banks by Type of Ownership	
						Inter.	Dom.	Non listed	Listed	Private	State-owned
Egypt	1989-2004	16	28	97%	2.778	13	15	10	18	14	14
Jordan	1989-2004	16	9	90%	3.167	6	3	0	9	9	0
Lebanon	1992-2003	12	45	90%	0.589	-	-	-	-	-	-
Morocco	1989-2004	16	9	82%	3.417	4	5	4	5	5	4
Tunisia	1989-2004	16	12	86%	1.207	2	10	3	9	7	5

[1] The data for Lebanon related to nationality, listing and bank ownership are not available.

Table 2: Descriptive Statistics

Measures of Bank's Behavior	Average real growth				End of Period Ratios		
	Total Assets	**Net Loans**	**Equity**	**Government Securities**	**Net Loans/Total Assets**	**Equity/Total Assets**	**Government Securities/Total Assets**
Panel A: Behavior Pre-Basel 1							
All Countries	10.43%	21.44%	83.54%	41.85%	9.57%	6.74%	31.36%
Egypt	5.93%	32.41%	14.09%	65.51%	40.53%	7.77%	42.85%
Jordan	6.47%	-8.02%	-9.38%	28.77%	44.65%	6.97%	9.46%
Lebanon	26.11%	26.22%	293%	37.40%	29.94%	4.61%	24.93%
Morocco	4.79%	9.98%	12.86%	11.95%	39.61%	7.75%	29.46%
Tunisia	3.7%	3.58%	16.32%	-	61.76%	7.56%	-
Panel B: Behavior Post-Basel 1							
All Countries	11.54%	9.58%	73.39%	26.51%	13.92%	10.21%	24.71%
Egypt	8.71%	5.02%	8.06%	34.27%	48.39%	9.26%	20.77%
Jordan	12.21%	1.12%	13.53%	47.54%	42.83%	10.38%	5.21%
Lebanon	14.94%	14.71%	149.54%	19.45%	29.98%	10.94%	28.54%
Morocco	7.25%	9.28%	7.06%	19%	48.42%	9.06%	38.66%
Tunisia	5.02%	7.72%	10.10%	-	67.85%	10.02%	-

Table 3: The Effects of Capital Adequacy Adoption on Bank's Real Total Asset

	All Countries	Egypt	Jordan	Lebanon	Morocco	Tunisia
Constant	6.747***	6.541***	2.843	13.888***	7.794***	5.941***
	(40.31)	(26.61)	(1.50)	(14.18)	(22.80)	(17.16)
Post-Basel-R.P.	0.337***	0.386***	0.168	-0.561***	0.519***	0.001
	(13.95)	(7.67)	(0.66)	(-5.89)	(9.01)	(0.03)
Growth in GDP	2.596***	4.234***	-0.888	4.716***	2.216***	2.514***
	(6.61)	(2.95)	(-0.63)	(3.38)	(5.66)	(2.87)
Loc. Cur./(US$)	-5.675***	-0.004	3.857	-0.009***	-0.049*	0.581***
	(-41.55)	(-0.25)	(1.34)	(-15.98)	(-1.61)	(3.29)
Interest Rate	-	-0.027*	0.227***	-0.017***	-	-
	-	(-1.66)	(4.91)	(-2.68)	-	-
F-statistic	-	-	-	-	-	-
F-test[a]	-	-	-	-	-	-
χ^2-Wald[b]	2718***	250.24***	55.80***	1332***	164.83***	55.48***
Hausman test[c]	3.34	0.14	0.54	0.63	0.09	0.34
No. of Banks	105	28	9	47	9	12
No. of Obs.	1244	378	113	498	111	149

This table reports panel regression of equation (1) for the impact of Basel Accord on bank's real total asset

Note: t-statistics are in parentheses. Significance at the 10%, 5%, and 1% level is noted by *,** and *** respectively.

[a] Fischer's test under the null hypothesis that the coefficients specific to each bank are all equal and constant.

[b] The χ^2 is for the Wald test whether the explanatory variables in the random coefficient models are jointly significant.

[c] Asymptotically distributed as χ^2 under the null hypothesis that the explanatory variables are not correlated with the error terms.

Table 4: The Effects of Capital Adequacy Adoption on Bank's Equity

	All Countries	Egypt	Jordan	Lebanon	Morocco	Tunisia
Constant	0.242***	0.125***	0.032	0.172	0.037**	0.032
	(12.13)	(9.31)	(0.11)	(1.34)	(2.46)	(1.25)
Post-Basel-R.P	0.018***	0.004	0.007	0.039***	0.011***	0.016*
	(5.42)	(0.90)	(0.18)	(3.13)	(3.70)	(1.83)
Growth in GDP	0.016	0.051	-0.163	-0.316*	0.067***	0.112
	(0.32)	(0.36)	(-0.71)	(-1.69)	(3.14)	(0.97)
Loc. Cur./(US$)	-0.259***	-0.002*	0.018	0.054	0.004**	0.036
	(-8.75)	(-1.68)	(0.04)	(0.499)	(2.49)	(1.57)
Interest Rate	-	-0.005***	0.013*	-0.002**	-	-
	-	(3.44)	(1.71)	(-2.06)	-	-
F-statistic	79.22***	-	-	-	-	-
F-test[a]	13.63***	-	-	-	-	-
?²-Wald[b]	-	40.49***	3.79	170.50***	72.24***	49.47***
Hausman test[c]	72.73***	1.51	0.43	1.61	0.87	0.90
No. of Banks	105	28	9	47	9	12
No. of Obs.	1244	373	113	498	111	149

This table reports panel regression of equation (1) for the impact of Basel Accord on bank's Equity/Total Assets ratio.

Note: t-statistics are in parentheses. Significance at the 10%, 5%, and 1% level is noted by [*],[**] and [***] respectively.

[a] Fischer's test under the null hypothesis that the coefficients specific to each bank are all equal and constant.

[b] The ?² is for the Wald test whether the explanatory variables in the random coefficient models are jointly significant.

[c] Asymptotically distributed as ?² under the null hypothesis that the explanatory variables are not correlated with the error terms.

Table 5: The Effects of Capital Adequacy Adoption on Bank's Government Securities

	All Countries	Egypt	Jordan	Lebanon	Morocco
Constant	0.779***	0.221	0.309***	-0.055	0.384**
	(6.37)	(0.98)	(2.69)	(-0.29)	(2.51)
Post-Basel-R.P	-0.093***	-0.051	-0.045***	0.041**	-0.017
	(-4.95)	(-0.67)	(-2.76)	(3.13)	(-0.63)
Growth in GDP	0.131	-2.468	0.142	-0.906***	0.232
	(0.58)	(-1.11)	(1.57)	(-1.69)	(1.21)
Loc. Cur./(US$)	-0.576***	-0.042	-0.335	0.214*	0.012
	(-3.92)	(-1.50)	(-1.90)*	(-0.68)	(0.86)
Interest Rate	-	0.062**	0.004*	-0.002	-
	-	(2.15)	(1.69)	(-1.39)	-
F-statistic	8.82***	-	-	-	-
F-test[a]	49.38***	-	-	-	-
χ^2-Wald[b]	-	24.01***	26.39***	25.08***	2.43
Hausman test[c]	13.69***	0.05	0.60	6.40	0.10
No. of Banks	87	23	8	47	9
No. of Obs.	921	255	99	456	111

This table reports panel regression of equation (1) for the impact of Basel Accord on bank's Government Securities/Total Assets ratio.

Note: t-statistics are in parentheses. Significance at the 10%, 5%, and 1% level is noted by *,** and *** respectively.

a Fischer's test under the null hypothesis that the coefficients specific to each bank are all equal and constant.

b The χ^2 is for the Wald test whether the explanatory variables in the random coefficient models are jointly significant.

c Asymptotically distributed as χ^2 under the null hypothesis that the explanatory variables are not correlated with the error terms.

Table 6: The Effects of Capital Adequacy Adoption on Bank's Net Loans Ratio (Berger et Udell, 1994 Approach)

	All Countries	Egypt	Jordan	Lebanon	Morocco	Tunisia
Constant	6.543***	0.6843***	0.234	-26.793	0.289***	0.553***
	(2.78)	(15.53)	(0.25)	(-1.35)	(3.85)	(7.60)
Post-Basel-R.P	1.725***	0.028	0.021	6.806***	0.187***	0.156***
	(2.98)	(1.17)	(0.836)	(3.75)	(3.63)	(3.21)
Lag Eq/Ta	5.603	-0.291	-0.375	-1.407	2.061***	0.905***
	(0.86)	(-1.51)	(-0.34)	(-0.08)	(3.91)	(3.21)
Lag Eq/Ta* Post-Basel-R.P	-12.016*	0.0362	0.283	-12.321	-1.876***	-1.381***
	(-1.87)	(0.18)	(0.26)	(-0.69)	(-3.05)	(-3.74)
Growth in GDP	-16.731***	1.184***	-0.205	-97.343***	0.081	-0.459
	(-2.86)	(0.006)	(-0.68)	(-4.10)	(0.76)	(-1.30)
Loc. Cur./(US$)	8.227**	-0.018***	0.407	33.953***	0.001	0.018
	(2.48)	(-3.28)	(0.29)	(2.63)	(0.06)	(0.25)
Interest Rate	-	-0.034***	-0.022***	0.175	-	-
	-	(-6.83)	(-2.95)	(0.66)	-	-
F-statistic	3.92***	-	3.59***	-	-	6.89***
F-test[a]	26.10***	-	5.71***	-	-	27.90***
?²-Wald[b]	-	217.55***	-	38***	54.76***	-
Hausman test[c]	10.63**	2.14	50.01***	0.99	0.06	24***
No. of Banks	105	28	9	47	9	12
No. of Obs.	1139	345	104	451	102	127

This table reports panel regression of equation (2) for the impact of Basel Accord on bank's Net loans/Total Assets ratio.

Note: t-statistics are in parentheses. Significance at the 10%, 5%, and 1% level is noted by *, ** and *** respectively.

[a] Fischer's test under the null hypothesis that the coefficients specific to each bank are all equal and constant.

[b] The ?² is for the Wald test whether the explanatory variables in the random coefficient models are jointly significant.

[c] Asymptotically distributed as ?² under the null hypothesis that the explanatory variables are not correlated with the error terms.

Table 7: The Effects of Capital Adequacy Adoption on Bank's Real Growth of Net Loans (Chiuri et al., 2002 approach)

	All Countries	Egypt	Jordan	Lebanon	Morocco	Tunisia
Constant	0.717*	0.091	4.691	-0.908***	-0.138	-0.155*
	(1.72)	(0.71)	(0.24)	(-4.01)	(-0.80)	(-1.74)
Lag Eq/Ta	2.974***	0.535***	-10.2914	0.641***	1.347**	-0.438**
	(3.89)	(3.46)	(-1.12)	(6.36)	(2.07)	(-2.35)
Diffeq	-0.082	2.301***	-73.701***	0.695***	1.223	0.92
	(-0.08)	(3.99)	(-3.40)	(7.27)	(0.90)	(1.46)
Lag Eq/Ta* diffeq	13.38**	-10.657***	980.111***	-0.688	-3.342	2.593
	(2.24)	(-2.18)	(7.24)	(-1.28)	(-0.25)	(0.58)
LogA	-0.128**	-0.009	-0.147	0.003	0.036	0.005
	(-2.36)	(-0.57)	(-0.84)	(0.26)	(1.54)	(0.73)
Growth in GDP	3.505**	0.753*	11.869*	-0.385	-0.155	0.258
	(2.45)	(1.82)	(1.74)	(-1.36)	(-1.13)	(0.78)
Loc. Cur./(US$)	-0.007**	-0.011**	-5.278	0.625***	-0.024***	0.117***
	(-2.47)	(-2.14)	(-0.18)	(3.97)	(-3.14)	(3.302)
Interest Rate	-	-0.005	0.160	-0.007*	-	-
	-	(-1.25)	(0.58)	(-1.83)	-	-
F-statistic	-	10.13***	-	21.12***	3.31***	-
F-test[a]	-	2.08***	-	2.50***	1.60	-
?²-Wald[b]	47.13***	-	159.65***	-	-	43.58***
Hausman test[c]	9.59	29.27***	9.47	101.11***	16.25***	4.75
No. of Banks	105	28	9	47	9	12
No. of Obs.	1138	345	103	451	102	137

This table reports panel regression of equation (3) for the impact of Basel Accord on bank's real growth of net loans.

Note: t-statistics are in parentheses. Significance at the 10%, 5%, and 1% level is noted by *,** and *** respectively.

[a] Fischer's test under the null hypothesis that the coefficients specific to each bank are all equal and constant .

[b] The ?² is for the Wald test whether the explanatory variables in the random coefficient models are jointly significant.

[c] Asymptotically distributed as ?² under the null hypothesis that the explanatory variables are not correlated with the error terms.

Table 8: The Effects of Capital Adequacy Adoption on Bank's Behavior: Discrimination by the Nationality of the Bank

	Real Total Asset		Government Securities		Equity		Net loans	
	International	Domestic	International	Domestic	International	Domestic	International	Domestic
Constant	6.265***	6.801***	-0.444**	0.166*	0.089***	0.087***	0.477***	0.573***
	(26.39)	(9.21)	(2.37)	(1.76)	(10.71)	(8.28)	(16.03)	(16.50)
Post-Basel-R.P	0.441***	0.373***	-0.205***	-0.062***	0.018***	0.019***	0.203***	0.075***
	(10.81)	(9.21)	(-3.49)	(5.98)	(5.04)	(3.55)	(6.86)	(4.99)
Lag Eq/Ta	-	-	-	-	-	-	1.065***	-0.355**
	-	-	-	-	-	-	(4.44)	(-2.05)
Lag Eq/Ta* Post-Basel-R.P	-	-	-	-	-	-	-1.476***	0.312*
	-	-	-	-	-	-	(-5.42)	(1.77)
Growth in GDP	2.384***	2.011***	0.515	0.195*	0.069	-0.025	-0.218	0.074
	(4.96)	(3.47)	(0.83)	(1.74)	(1.49)	(-0.31)	(-1.20)	(0.50)
Loc. Cur./(US$)	0.004	-0.012	0.004	0.019***	-0.001	-0.003*	-0.041***	-0.018***
	(0.24)	(-0.61)	(0.16)	(4.02)	(-1.06)	(-1.68)	(-6.53)	(-4.01)
F-statistic	1.79	5.45	0.47	2.54	3.77	2.65	35.46***	0.40
F-test[a]	-	-	-	-	-	-	14.81***	-
χ^2-Wald[b]	-	-	-	-	-	-	16.75***	-
Hausman test[c]	230.01***	139.74***	14.27***	37.65***	35.37***	12.98***	-	145.84***
No. of Banks	25	33	20	20	25	33	25	33
No. of Obs.	326	417	236	229	329	417	304	384

This table reports panel regression of equations (1&2) for the impact of Basel Accord on bank's behavior subdivided by international and domestic banks.

Note: t-statistics are in parentheses. Significance at the 10%, 5%, and 1% level is noted by *, ** and *** respectively.

[a] Fischer's test under the null hypothesis that the coefficients specific to each bank are all equal and constant.

[b] The χ^2 is for the Wald test whether the explanatory variables in the random coefficient models are jointly significant.

[c] Asymptotically distributed as χ^2 under the null hypothesis that the explanatory variables are not correlated with the error terms.

Table 9: The Effects of Capital Adequacy Adoption on Bank's Behavior: Discrimination by the Status of Quotation

	Real Total Asset		Government Securities		Equity		Net loans	
	Listed	Non Listed	Listed	Non Listed	Listed	Non Listed	Listed	Non Listed
Constant	6.384***	7.153***	0.309***	0.285	0.086***	0.081***	0.517***	0.547***
	(36.47)	(15.96)	(2.60)	(1.38)	(11.20)	(5.27)	(19.27)	(9.47)
Post-Basel-R.P	0.443***	0.281***	-0.151***	-0.078***	0.022***	0.006*	0.104***	0.141***
	(12.17)	(8.70)	(-3.90)	(-3.79)	(5.16)	(1.71)	(5.69)	(5.88)
Lag Eq/Ta	-	-	-	-	-	-	0.197	-0.061
	-	-	-	-	-	-	(0.99)	(-0.23)
Lag Eq/Ta* Post-Basel-R.P	-	-	-	-	-	-	-0.262	-0.948***
	-	-	-	-	-	-	(-1.25)	(-4.22)
Growth in GDP								
	2.041***	2.771***	0.376	0.314	0.006	0.082	-0.039	0.201
Loc. Cur./(US$)	(4.38)	(6.06)	(0.37)	(1.40)	(0.11)	(1.47)	(-0.28)	(0.83)
	0.005	-0.033**	0.001	0.026***	-0.003*	0.001	-0.026***	-0.014**
F-statistic	(0.29)	(2.10)	(0.37)	(2.86)	(-1.80)	(0.27)	(-6.42)	(-2.18)
F-test[a]	-	-	-	-	-	-	-	-
?²-Wald[b]	-	-	-	-	-	-	-	-
Hausman test[c]	265.26***	143.59***	17.15***	16.56***	29.03***	7.85***	108.96***	38.56***
No. of Banks	2.33	2.01	0.52	1.36	6.22	0.20	0.81	1.33
No. of Obs.	43	15	31	9	43	15	43	15
	568	178	364	101	568	178	525	163

This table reports panel regression of equations (1&2) for the impact of Basel Accord on bank's behavior depending on the listing or not of the bank.

Note: t-statistics are in parentheses. Significance at the 10%, 5%, and 1% level is noted by [*], [**] and [***] respectively.

[a] Fischer's test under the null hypothesis that the coefficients specific to each bank are all equal and constant.

[b] The ?² is for the Wald test whether the explanatory variables in the random coefficient models are jointly significant.

[c] Asymptotically distributed as ?² under the null hypothesis that the explanatory variables are not correlated with the error terms.

Table 10: The Effects of Capital Adequacy Adoption on Bank's Behavior: Discrimination by the Type of Ownership

	Real Total Asset		Government Securities		Equity		Net loans	
	Private	State-owned	Private	State-owned	Private	State-owned	Private	State-owned
Constant	6.197***	7.121***	0.381***	0.184	0.021***	0.086***	0.506***	0.552***
	(32.49)	(8.74)	(2.72)	(1.51)	(9.58)	(8.47)	(20.41)	(11.44)
Post-Basel-R.P	0.481***	0.279***	-0.177***	-0.066***	0.021***	0.014***	0.164***	0.093***
	(11.49)	(8.74)	(-3.90)	(-4.74)	(4.07)	(4.86)	(7.61)	(5.24)
Lag Eq/Ta	-	-	-	-	-	-	0.799***	-0.356*
	-	-	-	-	-	-	(3.80)	(-1.72)
Lag Eq/Ta* Post-Basel-R.P	-	-	-	-	-	-	-0.918***	-0.105
	-	-	-	-	-	-	(-4.17)	(-0.53)
Growth in GDP	2.042***	2.035***	0.511	0.224	0.015	0.047	-0.172	0.421**
	(4.28)	(3.41)	(1.16)	(1.08)	(0.25)	(0.82)	(-1.16)	(2.02)
Loc. Cur./(US$)	0.009	-0.017	0.004	0.022***	-0.002	-0.002**	-0.037***	-0.018***
	(0.45)	(-1.12)	(0.20)	(3.65)	(-1.20)	(-2.10)	(6.32)	(-3.72)
F-statistic	246.71***	114.63***	17.13***	24.65***	18.84***	26.56***	-	91.29***
F-test[a]	-	-	-	-	-	-	18.56***	-
?²-Wald[b]	-	-	-	-	-	-	19.43***	-
Hausman test[c]	5.48	0.40	1.27	3.57	1.27	1.04	23.47***	0.89
No. of Banks	35	23	26	14	35	23	35	23
No. of Obs.	471	275	312	153	471	275	436	252

This table reports panel regression of equations (1&2) for the impact of Basel Accord on bank's behavior depending on whether the bank is privately or state-owned.

Note: t-statistics are in parentheses. Significance at the 10%, 5%, and 1% level is noted by *, ** and *** respectively.

[a] Fischer's test under the null hypothesis that the coefficients specific to each bank are all equal and constant .

[b] The ?² is for the Wald test whether the explanatory variables in the random coefficient models are jointly significant.

[c] Asymptotically distributed as ?² under the null hypothesis that the explanatory variables are not correlated with the error terms.