How Do Banks Set their Capital?

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Abstract

We have analysed the determinants of capital for banks operating in the Lebanese market between 1994 and 2008. We firstly found that the subsidiaries of foreign banks hold significantly lower capital than their domestic counterparties and the institutional ownership has a productive impact on domestic bank capital. Secondly, the capital of domestic banks is shaped differently from that of foreign banks. For instance, the host market capital regulation is more binding for domestic banks than foreign banks. Besides, domestic banks use their capitalization level to signal, unlike foreign banks that rely on their reputation. Finally, regarding the cyclicality of bank capital, this only applies for domestic banks, whereas foreign bank capital does not follow the economic cycle of the host market.

Keywords: Bank capital; Capital requirements; Foreign banks.

1. Introduction

Banking is the most regulated industry, and bank capital standards are one of the most prominent aspects of such regulation. Banks are the most important financial intermediaries, and this is a result of their role as providers of payments, loans and deposits, monitoring services, and as producers of information. The importance of regulation of bank capital is derived from, among other things, its role in bank soundness and risk-taking incentives, its role in the corporate governance of banks, in addition to the influence of capital level on the competitiveness of banks.

This important role was one of the motives behind the international efforts to harmonise capital standards in the 1980s, when the international meeting of bank capital regulation started with the 1988 Basel Accord on capital standards. Since its introduction, this capital accord has been acknowledged for its contribution to the widespread use of risk-based capital ratios both as measurement of the soundness of banks and as trigger devices for regulators' intervention. The accord has generated a debate on how best to design the regulation of bank capital due to the differences in objectives of regulation on one hand, and the different results found by the studies on the optimal design of capital standards.

In order to suggest an optimal regulatory framework, a large body of literature has analysed the factors affecting and determining a bank capital and the reaction of bank capital to the change of one or more of those factors. Some of these studies have developed a number of principles and theories about the factors influencing bank capital structure and others analysed the response of banks to capital

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requirements. However – and according to our best knowledge – there is still a gap in the literature regarding the differences between domestic bank and foreign bank capital, for example: (i) what are the differences between domestic banks and foreign banks in terms of capital structure? (ii) How is a foreign bank capital determined? And (iii), do all capital theories apply to banks regardless of their ownership (i.e. domestic vs. foreign)?

Domestic banks and foreign banks operate and compete in one market; however, they may not be subject to the same influence of different micro- and macroeconomic factors. Among those different factors is the regulatory supervision. The different capitalisation level is due to the fact that foreign banks tend to hold a minimum (costly) capital required by regulators. On the other hand, domestic banks tend usually to keep more than the required capital and hold high "buffer" to be able to absorb shocks and to keep reserves to exploit any investment opportunities within their home market. Foreign banks do not implement the same policy, since their position as a subsidiary of a larger multinational bank, allows them to "import" funds when needed. Therefore, multinational banks keep minimum capital at their foreign subsidiaries and create an internal capital market to channel capital among the subsidiaries, or from the head office in the home market to the subsidiary.

Thus, we are going to assess in study the effect of capital requirements on banks, taking into consideration the effect of ownership. In other words, we will try to detect the importance of regulation and market forces on domestic and foreign banks separately. We will try also to detect: (i) how domestic and foreign banks are affected by (and react to) capital requirements, and (ii) how the effects of regulation and market forces changes between domestic and foreign banks. In order to find answers for the above questions, we will implement the Lebanese banking sector as a case study.

The decline of the regulatory control and supervision on the Lebanese banking system during the 1980s has provoked a growth in the number of unstable, undercapitalised and inefficient banks. For instance, during the years 1990, 1991 and 1992 the banking sector average equity-to-asset ratios were 1.38%, 1.66% and 1.94% successively, and the provisions for doubtful loans-to-gross loan ratios were 33.41%, 27.46% and 24% successively. Besides, the sharp depreciation of the local currency in late 1980s and early 1990s caused high withdrawal of deposits from the Lebanese banking sector and raised the rates of default of stressed borrowers. Consequently, Lebanese banks had suffered a severe decline in activity and profitability that reduced severely their capital. Before a banking crisis emerged, the central bank decided to restructure the banking system and push banks to recapitalise in order to avoid the catastrophic effects of a malfunctioning banking system. Efforts have been undertaken to reform the national banking system gradually. Firstly, a law introduced in November 1991 aimed at reforming the banking sector and focused on the following issues:

a- Giving the banks that have suffered losses of more than one quarter of their capital, one year to recapitalise otherwise they would be delisted from the list of approved banks.
b- Giving the Higher Banking Committee the authority to liquidate insecure banks.
c- Allowing the National Institute for Deposit Guarantee to guarantee the deposits of the relevant banks.

The next step has been the decision of moving towards consolidating the banking sector by the law 192, dated January 1992. This law aimed at facilitating bank mergers and acquisitions and offered incentives for merged banks. Vis-à-vis the law of facilitating bank mergers, the central bank has been issuing directives to push banks towards more mergers such as capital adequacy requirements and branch opening restrictions. In 1993, all banks operating in Lebanon became subject to the capital adequacy standards as implemented by Basel Accord in 1988 and were required to hold a minimum of 8% risk-adjusted capital. In September 1999, these capital requirements were increased by the central banks to become 10% by the end of 2000 and 12% by the end of 2001.

The paper proceeds as follows: in section 2 we present the development of capital standards during the past three decades. Section 3 cites the types of capital requirements. Section 4 shed light on the literature regarding the determinants of bank capital. The empirical methodology of the study is

presented in section 5. The data set exploited is presented in section 6. The empirical findings of the study are included in section 7.

2. The Development of Capital Standards

Capital requirements are motivated by two main concerns. First, "the safety net"[1] – particularly the deposit insurance component – makes the government (the deposit insurance agency) the largest uninsured creditor of banks, and capital requirements are a means to limit the risk exposure of government and taxpayers. Regulators as representatives of the Deposit Insurance, the central bank, and the taxpayers, are vulnerable to the same financial costs and expropriations of value as other creditors. Therefore, regulators require capital for almost all the same reasons that other uninsured creditors of banks: to protect themselves against the costs of financial distress, agency problems, and the reduction in market discipline caused by the safety net. Second, capital requirements protect the economy from negative externalities caused by bank failures, especially systemic risk. So, capital requirements help protect the financial system and the economy from the destructive effects of contagious bank runs (Berger et al., 1995).

2.1 The Flat-Rate Standard (the equity-to-asset ratio)

Until early 1980s there were no minimum capital requirements in most countries. After several banking and financial crises, the regulatory concerns about the safety of banking sectors, as well as the emphasis on capital adequacy, have pushed a wide range of countries to introduce formalised capital requirements. This development was spearheaded by the adoption of minimum capital requirements in particular countries (for example, the UK and the USA in early 1980s). Capital requirements were introduced in order to reduce the risk of banks by implementing a uniform standard (the flat-rate standard) that aims at increasing the capital-to-asset ratio. However, that was not an optimal solution. For instance, Koehn and Santomero (1980) examined the portfolio reaction to capital requirements by investigating the effect of minimum capital-to-asset ratio on the portfolio behaviour of banks and found that as a reaction for increasing capital requirement, banks have reshuffled their portfolios. The reaction of a bank with a low degree of risk aversion to an increase in capital-to-asset ratio was a larger shift towards riskier assets, which more than offsets the effect of increasing capital. Therefore, the chance of failure increases. So, risky institutions react to spoil the regulatory objectives, and the uniformly increase of capital requirements of the banking sector makes the relatively safe banks safer, while risky institutions become more risky. In addition, Kim and Santomero (1988) argue that an inflexible capital regulation via a simple capital-to-asset ratio gives banks an incentive to increase their business risk by portfolio realignment, especially under a regulation that does not consider asset quality in determining capital requirements. A later study by Bichsel and Blum (2004) examined also the relationship between leverage ratio and the risk of Swiss banks between 1990 and 2002 and found a positive correlation between change in capital and risk. They argue that these results indicate that simple leverage restrictions may not be sufficient regulatory instrument to ensure the stability and soundness of banks.

So, the implementation of capital regulation aimed to strengthen the soundness and stability of banking systems by forcing banks to boost their capital position, since higher capital levels are expected to allow the bank to absorb greater losses. However, capital regulation via a flat capital-to-

[1] The safety net is all government actions designed to enhance the safety and soundness of the banking system apart from regulation and enforcement of capital requirements. The safety net includes deposit insurance, unconditional payment guarantees, and access to the discount window, as well as all regulation and supervision procedures that are not directly related to capital.

asset ratio permitted banks to increase their business risk by portfolio reshuffling. This had increased bank regulators concerns and led to the Risk-Based Capital proposal.

2.2 The Risk-Based Capital

Failure of the uniform capital ratio regulation in limiting the risk of bank run has led to the devising of new standards for capital adequacy. Banking supervisors have proposed a framework that makes capital requirements vary according to the structure of assets and the riskiness of these assets. Therefore, different capital adequacy rules were introduced in 1988: the risk-based capital (RBC). In 1988, the Basel Committee on Banking Supervision introduced a capital measurement system commonly referred to as the Basel Capital Accord. This system provided for the implementation of a credit risk measurement framework with a minimum capitalisation level of 8% by end-1992. Since 1988, this framework has been progressively implemented in all countries with active international banks. The framework established a structure that aimed at: (i) making regulatory capital more sensitive to differences in risk profiles among banking organisations, (ii) taking off-balance sheet exposures into consideration when assessing capital adequacy, and (iii) lowering the disincentives to liquid assets with low risk. In June 1999, the Committee issued a proposal for a "New Capital Adequacy Framework" to replace the 1988 Accord. This second capital framework consists of three pillars: (i) a minimum capital requirements, (ii) supervisory review of an institution's internal assessment process and capital adequacy, and (iii) an effective use of disclosures to strengthen market discipline. Extensive interaction with banks and industry groups, have led to a new framework, which was introduced by end-2006: Basel II.

Basel II framework was not a simple change or a replacement of the old set of rules and standards, but it had a fundamental and dramatic impact on the performance and behaviour of banking institutions, particularly in the management of risks. This transition required the availability of many factors of success and efficiency in the banking sector, since it necessitates the implementation of developed and accurate policies and techniques, and the adoption of new accounting systems. Nevertheless, Basel II was a more developed and flexible framework than Basel I. It was expected that the new framework would contribute in improving the safety of the banking systems by stressing on the internal control in banks, in addition to the regulatory supervision and discipline of market participants.[2]

The explosion of the international financial crisis in 2008, has created doubts and accusations to Basel II, firstly for being unable to predict the crisis, and secondly for its failure of limiting the effects of this crisis. Many have even accused Basel II of having a role in amplifying the effects of the crisis. The critics to the new framework have based on the following:

- The inadequacy of the bank capital level, especially during crises.
- The interaction of Basel II rules with the International Accounting Principles for the calculation of the fair value.
- The pro-cyclicality of bank capital.
- The excessive reliance on rating agencies.
- The encouragement of using internal quantitative models, which may not reflect actual risks.
- Creating incentives for financial institutions to remove (deconsolidate) some of the risky assets off their balance sheets to avoid regulation (through securitisation).

As a result, many regulatory authorities and banks started demanding modifying Basel II and even replacing it with a new framework (Basel III), to correct its deficiencies and to add new

[2] While the old accord was based on a single technique and a general framework focusing on a single standard for measuring risks, the new framework is more comprehensive and more sensitive to risks and adopts a multi-level risk management to provide security and efficiency to banks.

mechanisms to predict crises (Early Warning Systems). The severity of the financial crisis during the past two years has already triggered fundamental reviews of the financial systems, the banking regulation, and also bank business models. Significant amendments to Basel II framework were proposed in January 2009, as part of a broad programme by the Basel Committee for Banking Supervision aimed at strengthening countries' regulatory framework.[3] The overarching aim of the Basel Committee and supervisors was to ensure that the international standards contribute to making banks sound and capable of withstanding shocks, by capturing banks' risk profile in a more comprehensive manner. More practically the objectives of Basel Committee were as follows: (Moody's 2009)

- Increasing banks' quality of capital.
- Adjusting the measurements of risks to best reflect the riskiness of bank operations and increasing bank capital buffers.
- Empowering supervisors with more effective tools to customise capital requirements to each bank's own risk profile.
- Reducing the pro-cyclicality of capital requirements and the creation of countercyclical capital buffers.
- Enhancing transparency and risk management practices.
- Limitation of banks' leverage.
- Better liquidity management.

3. The Capital Requirements

Berger et al. (1995) define two types of capital requirements that determine the level of bank capital: (a) market capital requirements, and (b) regulatory capital requirements. A bank's market capital requirement is the capital ratio that maximises the value of the bank in the absence of regulatory capital requirements, but in the presence of the rest of the regulatory structure that protects the safety and soundness of banks. This capital market requirement, which is different for each bank, is the ratio toward which each bank would tend to move in the long run in the absence of regulatory capital requirements. Unlike regulatory requirements, sanctions for departures from market capital requirements are two-sided, where the value of the bank will decline if it has either too little or too much capital. Billet et al. (1998) add that the combination of regulatory discipline and the market discipline determine a bank's cost of risk taking. Markets penalise banks for increasing risk, by increasing the costs of debt financing and by limiting the types of claims a bank may issue.

On the other hand, regulators impose discipline through risk-based capital requirements and insurance premiums, examination frequency and intensity etc. According to Billet et al. (1998), banks balance between the market discipline and the regulatory discipline and substitute towards the cheaper one. The substitution may be accomplished by varying the bank's reliance on insured deposits relative to uninsured liabilities.[4] Finally, Alexander (2004) stated that there is evidence that bank capital is increasingly determined by market forces rather than by regulatory requirements.[5] He adds that an explanation for this is that although regulators have set the right level of capital requirements, the market has coordinated on standards for prudent banks that exceed the true economic level of capital and the socially optimal level of capital. Moreover, even though these standards are excessive in terms

[3] See "Enhancements to the Basel II framework", Basel Committee on Banking Supervision, July 2009, and "Revision to the Basel II market risk framework", Basel Committee on Banking Supervision, July 2009.

[4] Billet et al (1998) argue that regulatory discipline is less costly to bank shareholders than market discipline and thus, banks can shield themselves from the impact of market discipline through the judicious use of insured deposits.

[5] In the 1990s and early 2000s, banks in the G10 countries have consistently held capital that far exceeds the regulatory minimum requirement. For instance, US bank holding companies have on average held between 12 and 13% capital throughout the 1990s. Similarly, UK banks and building societies have held between 12 and 14% throughout the 1990s and 2000s.

of economic capital, banks have to follow them otherwise they would be punished by the market, where depositors could withdraw their funds or the banks become unable to access certain markets anymore if their capital levels fall below their peers' levels.

4. The Determinants of Bank Capital

Based on the discussion presented in section 3, the main factors that shape the level of bank capital are the following.

4.1 Capital Regulation

The deposit insurance[6] may give banks an incentive to increase risk either by increasing the riskiness of their assets or by increasing their leverage. This risk-shifting incentive and the potential externalities resulting from bank failures, has been among the reasons for regulating bank capital. Depositors are fully insured and therefore, they have no incentive to adjust the demand returns for the risk undertaken by the bank. Moreover, because sometimes the deposit insurance charges banks a flat insurance premium, this gives them an incentive to increase risk. Santos (2000) argues that the need to regulate banks is caused by corporate governance problems arising from the separation of ownership from management. When frictions prevent the writing of complete contracts between shareholders and managers, the financial structure of a firm is important because it determines the allocation of control rights among the firm's claimholders. In the case of banks, an efficient allocation of control rights need to take account of the fact that bank debtholders (depositors) are not in a position to monitor managers because they are small and uninformed and thus, they need a representative. Moreover, the lower the bank's solvency, the stronger the shareholders' bias towards more risk. According to Santos (2000), an efficient regulation requires an increase in interference when bank performance deteriorates and includes a credible mechanism to transfer control to the regulator when the bank's solvency is low. The minimum solvency requirement could be part of such regulation if it defines the threshold for the transfer of control to the regulator.

Bank regulators face agency conflict regarding the firms they supervise because of different goals and objectives, asymmetric information, or dishonesty. Banking authorities use the regulatory interference in an attempt to correct an unsafe or unsound banking practice. The major instrument of regulatory interference is capital regulation.[7] As other forms of regulation are removed, capital adequacy regulation gets relatively more important. In addition, the experience from banking crises in several countries during the last decades have made both regulators and the banks themselves more aware of the importance of a sufficient capitalisation level.

Studies that assessed the impact of regulation on banks' capital level, and how important regulations are in determining banks' capitalisation, found that regulators represent an important factor in determining banks' capital level, not dominant though. For instance, Barrios and Blanco (2003) developed two models to explain how Spanish banks set their capital level: a "market model" and a "regulatory model". They found that the market model explains better the behaviour of Spanish commercial banks, and the average probability of belonging to either regime (the market or the regulatory regime) was close to 0.7 and 0.3 respectively, which provides evidence of the dominance of

[6] In Lebanon, the National Deposit Guarantee Institution (NDGI) provides the insurance to deposits in Lebanon, which was established after the failure of Bank Intra in 1966. The NDGI is a cooperative joint stock company, where banks participate in half of its capital and the government in the other half, and this capital is increased or decreased whenever a new bank is listed or deleted from the banks' list, by the amount of the bank's contribution plus the equivalent government contribution. The NDGI guarantees resident and non-resident deposits in all currencies, except foreign currency deposits held in branches abroad. The NDGI source of funds is the annual premium paid by banks, and an amount paid annually by the government, which is equal to the total annual premium paid by all banks. (Source: the central bank of Lebanon)

[7] Other instruments include cease-and-desist orders, removal of officers and directors, the threat of termination of deposit insurance, and denial of requests for expansion into new products or markets.

the market model. They stated that capital adequacy regulation is a factor related to capital decisions, however, it is not the most important, and the pressure of market forces is the main determinant of banks capital requirements.

4.2 Size Effects and the Too-Big-to-Fail Theory

The Too-big-to-fail theory emerged in 1984. This term is frequently used in banking to describe how bank regulators deal with troubled banks.[8] Studies that analysed market capital requirement and the determinants of bank capital show a negative impact of size on the level of capital. Among those studies, Kwan and Eisenbeis (1997) and Rime and Stiroh (2003) who find a negative and significant relation between size and capital. Bongini et al. (2001) found evidence of too-big-to-fail policies pursued by national authorities in the East Asian countries during the 1997 crisis. Chiuri et al. (2002) tested the effect of capital adequacy requirements on bank lending policies in 15 emerging markets and found that both deposits and loans grow at a higher rate for larger banks. They argue that this is consistent with the Too-Big-To-Fail hypothesis, according to which consciousness that the risk of closure during the crisis is lower for larger institutions drives depositors to move their deposits to larger banks. Cebenoyan and Strahan (2004) also found a negative relation between capital-to-asset ratio and bank size and increasing in bank size is associated with lower capital ratios, suggesting that larger internal capital markets allow banks to operate with a smaller cushion against insolvency. Finally, Lindquist (2004) found a negative effect of size on Norwegian banks' buffer. He claimed that this could be due to the higher level of monitoring and screening in large banks, which may reduce the need for buffer capital as insurance, or it is related to the too-big-to-fail hypothesis.

Shrieves and Dahl (1992) studied the determinants of U.S. bank's capital changes (ΔCAP) and found a negative impact of size on ΔCAP. Besides, size was more significant for low capitalised banks than for high-capitalised banks. They argued that this could indicate that large banks were either subject to less regulatory pressure to increase capital, or that pressure exerted was less effective. Rime (2001) repeated the same test for Swiss banks. He also finds that the size of banks has a negative and significant impact on capital changes, and large banks have excess capital less than smaller ones. Godlewski (2005) applied also a similar methodology to those of Shrieves and Dahl (1992) for 30 emerging markets (from Central and Eastern Europe, Asia and South America) and found similar results: the size of banks has a negative and significant impact on capital.

Finally, Houston and James (1998) argue that by establishing an internal capital market within a bank holding company, larger and diversified banks can more efficiently allocate funds within the organisation and avoid or lessen external financing costs. Such transfers of capital across regions may be difficult and costly if the bank is not affiliated with a bank holding company.

4.3 The Cyclicality of Bank Capital

Banks may hold excess capital to be able to exploit unexpected investment opportunities. This argument, in fact, depends on how difficult it is for a bank in the short run to increase its capital, and it may be expected that banks' buffer capital to decline in periods of high economic growth, since more profitable projects are likely to exist. As a result of their evaluation of future risk and investment opportunities today versus tomorrow, banks may use their buffer capital to either dampen or increase the pro-cyclical effects embedded in the legislation. Cull et al. (2002) state that the pro-cyclicality comes from the closer link between risk and capital requirement. In an economic downturn, risk is

[8] The term came into usage when the regulators in the US were faced with the insolvent Continental Illinois National in Chicago, which was the largest seventh bank in the country and the largest correspondent bank having interbank deposit and federal funds relationship with more than 2200 other banks. Rather than allowing the bank to fail, the federal regulators protected all uninsured deposits and creditors against loss by recapitalising the bank and kept it solvent (Kaufman, 2002).

more likely to increase, and the capital requirement may therefore increase. Banks are expected to respond by reducing their supply of new loans, and this will slow down economic growth, while the opposite is expected to happen in an economic development.

The international financial crisis has shown that losses incurred in the banking sector can be large if a downturn was preceded by a period of excess credit growth. Therefore, the Basel Committee for Banking Supervision has proposed setting a countercyclical buffer to ensure that the banking sector capital requirements take into consideration the macro-financial environment where banks operate. This buffer should be deployed when excess aggregate credit growth is associated with a build-up of system-wide risk. This countercyclical capital buffer works by giving each jurisdiction the ability to use their judgment to extend the size of the minimum buffer range established by the capital conservation buffer. Banks with purely domestic credit exposures will be subject to the full amount of the prevailing add-on published by their home jurisdiction, whereas internationally active banks will look at the geographic location of their credit exposures and calculate their buffer add-on for each exposure on the basis of the buffer in effect in the jurisdiction in which the exposure is located. Besides, the countercyclical capital buffer proposal implies jurisdictional reciprocity. The host market authorities take the lead in setting buffer requirement applied to the credit exposures of local entities located in their jurisdiction, and the home market authorities are responsible for ensuring that the banks they supervise correctly calculate their buffer requirements based on the geographic location of their exposures.[9]

4.4 Ownership Structure

During the 1980s, banks in some countries were at competitive disadvantages relative to banks in other countries. Levelling the playing field internationally was one objective behind the Basle Accord. These competitiveness differences were due to differences in the cost of capital, where the differences in the protection provided by the safety net in each country could affect a bank's cost of equity. The introduction of minimum capital requirements aimed at narrowing the international differences and competitiveness among banks. Imposing comparable capital standards on banks across countries diminishes the value of having a strong safety net. Thus, internationally agreed minimum capital standards narrow international cost-of-equity differentials for banks.

The majority of studies looking at the effect of foreign banking on the host markets tend to ignore the regulatory issue and how foreign banks react to the host market capital requirements, and if capital requirements of the host market are binding for foreign banks. Makler and Ness (2002) raise this issue by arguing that although foreign banks aid in the development of financial systems, they increasingly place financial institutions beyond the reach of effective national regulation. They add that emerging market regulators depend on the monitoring of the regulators from the bank's parent country, which diminishes their effective sovereignty in this area. Chiuri et al. (2002) argue that foreign banks are less sensitive to "shocks" caused by higher capital requirements, and that the impact of more stringent minimum capital regulations on banks' deposit taking in some emerging markets, has been smaller for foreign banks. Song (2004) points out a problem facing regulators, which is particularly acute in small countries. In some circumstances, such countries may have a few large companies, and local banks cannot compete because large exposure rules prevent them from offering large lines, whereas a small branch of a major international bank can offer these lines using the parent bank's world-wide capital. He adds that many countries have tried to level the playing field by requiring such banks to have some form of quasi-capital and sometimes limit lending to a multiple of that local quasi-capital in order to tie foreign bank down and restricts its ability to compete. However, that is often ineffective because quasi-capital requirements can meet simply by a "piece of bookkeeping" where

[9] Consultative document on "Countercyclical capital buffers", Basel Committee on Banking Supervision, July 2010.

foreign bank branches can avoid the requirements by booking some of the transactions at the offshore branches. Another issue confronting supervisors is that foreign banks entering local markets tend to offer a variety of new financial products, including derivatives, in order to expand their market share in the local market. These new derivative products can allow market participants far better hedging opportunities and, thereby, can be a source of considerable benefit, but they may also be used as a way of avoiding prudential regulations.

4.5 Asymmetric Information and Signaling

Bank managers have more information about their banks' financial condition than the capital markets. The private information produced by banks regarding their loan portfolio creates an asymmetric information problem for banks vis-à-vis financial markets. Because of this opacity, the market draws inferences from the actions of the bank and managers may signal information to the market through capital decisions.

If it is less costly for a "good" bank to signal high quality through increased leverage than for a "bad" bank, a signalling equilibrium may exist in which banks that expect to have better future performance have lower capital. Alternatively, a signalling equilibrium may exist in which higher capital signals favourable private information. Asymmetric information combined with transaction costs of new issues may also influence the relative costs of internal versus external finance and the relative costs of debt versus equity.

Hughes and Mester (1998) claims that managers use the level of financial capital to signal the level of risk, where an increase in financial capital reduces the probability of insolvency. Since financial capital constitutes the bank's own bet on its management of risk, it conveys a credible signal to depositors and other stakeholders of the resources allocated to preserving capital and insuring the safety of their depositors. Finally, the confidence in a bank is a function of the real or economic net worth, the stability of economic or real earnings, and the information quality. Each of these factors has a positive and direct effect on confidence for individual banks and the banking system. The more economic net worth a bank has, the safer it is perceived to be. Besides, the better the quality of information available about a bank's financial conditions, the more confidence interested parties have in the bank. Moreover, because it is common to view bank capital or net worth as a cushion to absorb unexpected losses arising from credit, interest rate, and operating risks, bank capital can be viewed as the critical element in generating confidence about a bank's ability to handle uncertainty.

5. METHODOLOGY

5.1 Model specification

The bank capital level is thus assumed to be determined by two types of variables: market capital requirements and regulatory capital requirements. The capital level depends upon a set of exogenous internal variables, exogenous external variables, and regulation. Among the internal factors, we can cite the bank's size, profitability, investment, ownership structure, etc…, and for the external factors there is the economic growth. On the other hand, the regulation is the capital requirements. The equation relating bank capital to the set of variables is therefore:

$$CAP_{it} = \beta_0 + \beta_1 ROA_{it} + \beta_2 SD(ROA)_{it} + \beta_3 SIZE_{it} + \beta_4 RISKY_{it} + \beta_5 DEP_{it} + \beta_6 CREDRISK_{it} + \beta_7 TBILLS_{it} + \beta_8 INST_{it} + \beta_9 FOREIGN_{it} + \beta_{10} SIGNAL_{it} + \beta_{11} GDPG_t + \varepsilon_t \quad (1)$$

5.2 Variables Specification

Firstly, to detect the effect of regulatory capital requirements (capital regulation) on bank capital (CAP), we exploit three variables: risky assets (RISKY), credit risk (CREDRISK), and Treasury bills (TBILLS).[10]

Secondly, regarding the effect of the market capital requirements, we will employ the following variables. ROA will test the effect of bank profitability on bank capital. Whereas the standard deviation of ROA (SD(ROA)) will test the effect of the profitability's variability. SIZE will be utilised to control for the effect of bank asset size. DEP will examine the effect of deposit growth. For foreign ownership, we define the subsidiaries of foreign banks as "foreign". We proxy for this factor by a dummy variable (FOREIGN) that takes the value of 1 if the bank is "foreign", zero otherwise. We add another ownership variable to detect the effect of institutional ownership on banks by employing a dummy variable (INST) that takes the value of 1 in the presence of an institutional ownership in the bank equity, zero otherwise. For the effect of asymmetric information and how banks use their capital as signal for solvency, we employ SIGNAL. Finally, to control for the effect of the economic environment on banks' capital and to detect the cyclicality of bank capital, we exploit the GDP growth (GDPG).

6. Data

6.1 Source of Data

To estimate Equation 1, we use a panel data set for the Lebanese commercial banks between 1994 and 2008, i.e. 15 years. 59 banks are included in our data set. Annual data (balance sheets and P&L accounts) are used for almost all of the population of Lebanese commercial banks. Few banks were dropped from the study because of lack of data. Data for some banks for some years were not available therefore we are analysing an unbalanced sample. The source of micro data is BilanBanques and the macroeconomic data are taken from the International Financial Statistics, IMF.

6.2 Descriptive Statistics

Table 1 presents the descriptive statistics for domestic banks and Table 2 presents the descriptive statistics for foreign banks.

We notice that for both categories of banks, the capitalization level has significantly improved during the period under study. For domestic banks, the equity-to-asset ratio has increased from an average of 5.34% in 1994 to an average of 11.42% in 2008, with an average of 10.10% for the entire period. For foreign banks, this ratio has increased from an average of 5.69% in 1994 to an average of 10.25% in 2008 with an average of 9.99% over the entire period. This was due to imposing Basel I and II requirements on all banks operating in Lebanon by the central bank.

Foreign banks have a higher average ROA than domestic banks. For the entire period, the average domestic bank ROA is 0.83%, whereas the average foreign bank ROA is 1.11%. But the dispersion of profitability (represented by the standard deviation of ROA) was reported at foreign banks higher than domestic banks (0.43% vs. 0.75% respectively).

Table 1 and Table 2 also show that domestic banks hold risky assets more than foreign banks, with a tendency to decrease the proportion of risky assets at both groups of banks. Over the entire period, the average ratio of risky assets-to-total assets was 51.93% for domestic banks and 44.04% for domestic banks.

Domestic banks have attracted more deposits during the period under study and this shown by the average growth rate of deposits, which is 28.92% for domestic banks and only 13.14% for foreign

[10] For the calculation of the variables, see Appendix A.

banks over the whole period. Interestingly, the variable representing credit risk shows that domestic banks have lower credit risk than foreign banks (16.73% and 23.24% respectively). Finally, domestic banks invest more than foreign banks in government securities, where the average percentage of funds invested at the domestic and foreign banks is 28.64% and 23.11% respectively.

Table 1: Descriptive statistics for domestic banks operating in Lebanon (percentage)

		CAP	**ROA**	**SD(ROA)**	**RISKY**	**DEP**	**CREDRISK**	**TBILLS**
1994	Mean	5.34	1.31	0.94	55.74	36.31	18.03	30.52
	SD	3.63	1.03	1.88	10.28	17.43	24.44	8.63
1995	Mean	10.18	0.97	0.64	58.52	28.20	13.11	28.97
	SD	15.92	1.37	0.49	10.08	26.70	13.82	9.44
1996	Mean	8.76	1.26	0.61	55.06	35.49	11.84	33.04
	SD	5.62	1.01	0.49	9.73	16.91	12.46	9.63
1997	Mean	10.31	1.32	0.68	58.08	29.27	16.20	27.65
	SD	7.56	1.18	0.61	11.97	21.03	16.04	10.65
1998	Mean	10.14	1.00	0.61	57.89	30.67	14.17	30.31
	SD	7.37	0.80	0.55	13.05	40.78	13.49	11.12
1999	Mean	9.49	0.67	0.52	54.95	22.51	14.46	33.46
	SD	7.07	0.77	0.55	11.51	50.78	10.99	10.53
2000	Mean	9.32	0.43	0.46	55.36	18.63	15.47	31.81
	SD	6.54	0.99	0.41	12.70	24.94	12.43	11.87
2001	Mean	10.34	0.48	0.32	52.37	10.89	19.81	30.88
	SD	6.85	0.74	0.26	11.34	14.96	15.25	10.53
2002	Mean	9.33	0.69	0.27	49.45	16.16	21.65	34.10
	SD	6.81	0.49	0.26	12.01	15.05	13.46	11.59
2003	Mean	11.53	0.69	0.21	45.92	19.98	24.85	23.77
	SD	5.71	0.62	0.22	13.48	14.53	17.58	9.09
2004	Mean	11.23	0.64	0.36	46.77	14.17	28.69	23.62
	SD	5.14	0.35	0.93	13.84	14.69	29.30	9.76
2005	Mean	11.95	0.66	0.22	44.55	4.18	26.63	25.84
	SD	5.24	0.40	0.22	13.83	8.50	24.07	11.22
2006	Mean	9.94	0.68	0.20	46.59	9.86	8.89	26.98
	SD	4.16	0.64	0.20	13.89	9.03	6.01	11.04
2007	Mean	12.28	0.73	0.20	49.78	4.83	9.07	23.63
	SD	12.74	0.70	0.22	13.77	31.34	9.23	15.13
2008	Mean	11.42	0.89	0.25	47.90	152.67	8.03	24.98
	SD	11.64	0.50	0.29	13.97	731.46	8.25	11.82
Grand mean		10.10	0.83	0.43	51.93	28.92	16.73	28.64

Table 2: Descriptive statistics for foreign banks operating in Lebanon (1994-2008)

		CAP	ROA	SD(ROA)	RISKY	DEP	CREDRISK	TBILLS
1994	Mean	5.69	1.78	0.96	47.11	30.18	21.99	21.29
	SD	3.73	2.30	1.09	13.69	31.73	24.91	10.03
1995	Mean	8.45	1.88	1.73	46.60	13.04	16.21	22.17
	SD	5.91	1.98	3.26	16.13	23.09	18.19	9.42
1996	Mean	9.23	1.81	0.86	46.55	25.87	17.12	28.47
	SD	5.99	2.68	0.94	15.30	22.44	19.32	11.88
1997	Mean	11.09	1.41	0.95	45.73	17.76	15.72	24.48
	SD	10.62	1.14	1.08	15.03	21.88	12.42	11.36
1998	Mean	10.44	1.37	0.90	47.32	11.00	15.09	25.60
	SD	10.44	0.98	1.18	14.70	22.35	11.42	12.69
1999	Mean	10.87	0.76	0.61	45.96	12.93	15.70	28.29
	SD	8.48	1.18	0.46	16.54	23.00	11.17	14.23
2000	Mean	10.16	0.78	0.49	46.07	15.86	18.60	24.12
	SD	7.55	1.47	0.51	16.15	18.78	14.16	15.11
2001	Mean	10.27	0.68	0.44	47.77	13.27	25.34	21.09
	SD	7.68	1.49	0.64	15.67	50.39	34.85	14.14
2002	Mean	9.47	0.88	0.59	44.15	24.42	23.49	23.17
	SD	6.82	1.12	0.56	13.26	87.05	19.32	14.27
2003	Mean	9.77	0.56	0.51	41.12	2.96	41.05	18.33
	SD	7.31	1.04	0.36	13.07	9.95	44.77	12.43
2004	Mean	11.00	-0.05	0.45	40.58	7.84	60.10	20.28
	SD	9.03	2.90	0.36	14.81	8.92	120.76	14.05
2005	Mean	11.06	0.84	0.81	40.02	-3.22	42.86	20.17
	SD	11.07	1.29	1.84	13.94	19.70	50.73	11.39
2006	Mean	10.96	0.77	0.85	39.85	5.40	14.36	22.12
	SD	9.89	1.93	1.85	13.01	14.41	11.81	14.25
2007	Mean	11.21	1.48	0.54	40.07	3.83	10.77	21.13
	SD	9.87	1.47	0.68	12.76	13.43	9.68	13.99
2008	Mean	10.25	1.66	0.57	41.69	15.92	10.27	25.95
	SD	9.80	1.70	0.54	16.06	14.85	10.90	15.33
Grand mean		9.99	1.11	0.75	44.04	13.14	23.24	23.11

7. Empirical Results

7.1 The Determinants of Bank Capital and the Effect of Foreign Ownership

In this section, we include in the estimations all banks in our sample, regardless of their ownership (i.e. foreign or domestic). The aim is to compare domestic banks with the subsidiaries of foreign banks and detect any differences in terms of capitalisation. The outcomes of the regressions are reported in Table 3. Before analysing the effect of individual coefficient, we notice that the several regression models (i.e. the several combinations of variables) seem to be satisfactory for estimating the determinants of bank capital in Lebanon since they generate adjusted R-squared that range between 75% and 83%. Besides, the F-statistics show the significance of these models.

Table 3: The determinants of bank capital and the effect of foreign ownership

	(1)	(2)	(3)	(4)	(5)	(6)
C	24.82***	29.72***	24.86***	5.45***	0.22	28.53***
	(3.83)	(3.45)	(3.64)	(1.47)	(2.27)	(3.81)
ROA	0.12	0.15	0.15		0.25	
	(0.15)	(0.15)	(0.15)		(0.18)	
SD (ROA)	0.35*	0.37**		0.54***		
	(0.19)	(0.19)		(0.19)		
SIZE	-2.16***	-2.30***	-2.16***			-1.48***
	(0.28)	(0.27)	(0.28)			(0.26)
RISKY	0.002		0.02		0.02	
	(0.02)		(0.01)		(0.02)	
DEP	-0.05***	-0.05***	-0.05***	-0.05***		
	(0.005)	(0.005)	(0.005)	(0.005)		
CREDRISK	-0.003	-0.002		-0.001		
	(0.003)	(0.003)		(0.003)		
TBILLS		-0.08***		-0.06***		-0.12***
		(0.02)		(0.02)		(0.02)
FOREIGN	-6.72*	-2.85	-3.86	-0.06	-8.61*	-3.07
	(3.31)	(3.25)	(3.35)	(3.43)	(4.04)	(3.88)
SIGNAL	0.99***	0.95***	0.96***		0.65***	
	(0.19)	(0.19)	(0.19)		(0.19)	
GDPG	0.12**	0.07		0.03	0.05	
	(0.05)	(0.05)		(0.05)	(0.06)	
Adj.- R^2	0.8321	0.8381	0.8301	0.8177	0.7534	0.7713
Obs.	676	676	682	676	684	684
F-statistic	50.94	53.18	52.99	48.32	34.13	38.76
Prob(F-stat.)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hausman test χ^2 statistic	104.2099	129.7072	100.6345	92.8563	162.8470	168.2886
Prob(χ^2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

***Notes*:**
Standard error in parentheses.
*** Significantly different from zero at the 1% level.
** Significantly different from zero at the 5% level.
* Significantly different from zero at the 10% level.

Firstly, the results reported in Table 3 show that the profitability (ROA) has a positive weak effect on bank's capitalisation, which suggests that banks do not heavily rely on (retained) profits to increase their capital. Thus, banks (domestic and/or foreign?) that have higher profitability are not necessary to hold higher capital. This may show that banks in Lebanon rely on the external sources of funding instead of the internal sources. On the other hand, the volatility of profitability represented by the standard deviation of ROA has a positive and significant effect on capital. This suggests that when earnings become volatile, banks tend to boost their capital by using external funds.

Larger banks hold lower capital than their smaller ones, which is shown by the negative and significant effect of SIZE. Thus, the Too-Big-To-Fail principle holds in this context. This is consistent

with the findings of the literature, which show that larger banks have better ability to access capital markets (local and/or international) and increase their capital when needed. Larger banks tend to keep lower capital, and they can easily adjust their capital for any new capital requirements or for any new investment opportunities.

Regarding RISKY and CREDRISK, we do not observe any significant effect and there is no evidence that banks modify their capital according to the increase/decrease in risky assets and/or credit risk, which is required by Basle I and II. This may suggest that the regulatory effect is not binding here.[11] TBILLS has a negative and strong correlation with bank capital. This shows that banks tend to hold less capital when investing in government securities.

The deposits growth rate (DEP) has a negative and significant effect on bank capital. Therefore, banks rely on deposits to increase their investment capabilities. This may suggest the existence of moral hazard, where banks use the deposit insurance privilege to increase their leverage.

The variable FOREIGN representing the ownership is negatively correlated with capital, which means that domestic hold higher capital than foreign banks operating in the Lebanese market. This is due to: (i) since capital is costly, foreign banks tend to keep a minimum capital in their subsidiaries, and channel funds to these subsidiaries only when needed, and (ii) the role of the foreign bank's subsidiary in the host market is to collect deposits and channel them to their parent bank (in their home market) where investment opportunities could be more feasible, thus keeping the "unused" funds at their minimum.

The results also give support to the "signalling theory": banks do use their solvency as a signal to depositors and other stakeholders. This is shown by the positive and significant effect of SIGNAL on capital.

Finally, we find that the GDP growth has a positive and significant influence on bank capital in one model only. This gives little support to the theory of bank capital cyclicality where banks tend to adjust their capital according to the economic cycle.

In order to detect if the above cited results apply for domestic or foreign banks, we split our sample into 2 sub-samples: domestic banks and foreign banks. Only the subsidiaries of foreign banks are considered "foreign", since our aim is to detect the difference between domestic banks (regardless of their ownership) and the subsidiaries of foreign banks and not the effect of foreign ownership on domestic bank capital. This separation will show if the results reported in Table 3 would hold for the 2 categories, or different results would emerge. The results are reported in the following sections.

7.2 The Determinants of Domestic Bank Capital

This section includes the estimations for domestic banks regardless of their ownership (i.e. majority domestic ownership or majority foreign ownership) to detect the determinants of domestic bank capital. The results are presented in Table 4. The presented models are satisfactory for estimating the determinants of domestic bank capital since they generate adjusted R-squared that range between 67% and 80%. Besides, the F-statistics show the significance of these models.

The empirical results reported for domestic banks show many differences from those for the entire sample. Firstly, the profitability of domestic banks shows a negative (insignificant) effect in 2 models and a positive (insignificant) effect in 2 other models. This does not allow obtaining a clear result on the effect of profitability on domestic bank capital. But we could conclude that domestic banks do not depend on profits to increase equity. It is not necessary that more profitable banks have higher capital. This could be evidence that Lebanese banks meet the capital requirements through external sources such as issuing equity or debt, instead of relying on internal source represented by

[11] These findings are consistent with those of Billet et al. (1998), who show that banks consider the market discipline (reaction) more importantly than the regulatory discipline. However, we have to deepen our analysis to find out if this conclusion is applicable for foreign or domestic banks. This analysis will be done in the following sections.

retained earnings. Our results therefore, do not match the findings of the literature, which show a positive association between profitability and bank capital.[12] Conversely, the volatility of earnings has retained its significant effect in Table 4 where this variable is positively and significantly correlated with bank capital. This could be surprising since we have found that domestic banks do not rely on profits to increase their capitalisation. An interpretation for this is that when earnings become volatile, domestic banks tend to boost their capital (using external sources) as a proactive action to face possible deteriorating conditions.

Table 4: The determinants of domestic bank capital

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
C	20.37***	30.01***	23.66***	6.48***	-3.20	26.52***
	(4.74)	(4.46)	(4.54)	(1.05)	(2.47)	(3.85)
ROA	-0.06	-0.06	0.13		0.25	
	(0.28)	(0.27)	(0.27)		(0.33)	
SD (ROA)	0.87*	0.93*		1.84***		
	(0.51)	(0.49)		(0.47)		
SIZE	-1.97***	-2.26***	2.21***			-1.74***
	(0.38)	(0.37)	(0.35)			(0.29)
RISKY	0.03		0.04*		0.04*	
	(0.02)		(0.02)		(0.02)	
DEP	-0.06***	-0.05***	-0.06***	-0.05***		
	(0.008)	(0.007)	(0.007)	(0.007)		
CREDRISK	-0.003	-0.002		-0.03*		
	(0.02)	(0.02)		(0.02)		
TBILLS		-0.10***		-0.09***		
		(0.02)		(0.02)		
INST	0.91	0.57	1.39*	0.87	0.45	1.62**
	(0.75)	(0.74)	(0.75)	(0.70)	(0.89)	(0.76)
SIGNAL	1.02***	0.97***	1.03***		0.80***	
	(0.28)	(0.27)	(0.26)		(0.27)	
GDPG	0.17***	0.19***		0.05	0.14*	
	(0.06)	(0.06)		(0.07)	(0.08)	
Adj.-R^2	0.7905	0.8016	0.7896	0.7838	0.6716	0.7802
Obs.	427	427	428	427	430	428
F-statistic	35.95	38.41	38.26	36.91	21.89	38.91
Prob(F-stat.)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hausman test						
χ^2 statistic	48.3049	68.5155	48.1690	45.3067	67.4139	35.9488
Prob(χ^2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

***Notes*:**
Standard error in parentheses.
*** Significantly different from zero at the 1% level.
** Significantly different from zero at the 5% level.
* Significantly different from zero at the 10% level.

[12] See for instance, Marcus (1983), Dietrich and James (1983), Allen and Rai (1996), Kwan and Eisenbeis (1997), Jacques and Nigro (1997), and Rime (2001).

SIZE shows a negative and significant impact and larger domestic banks hold less equity and have higher financial leverage than smaller ones. Larger domestic banks consider themselves "too-big-to-fail" and therefore, keep less capital.

In contrast to the effect shown in Table 3, RISKY has captured a positive and significant effect in 2 out of 3 models presented in Table 4. According to Basle II, the increase in risky assets should be accompanied by an increase in capital, and thus, domestic banks do modify their capitalisation according to the existence of risky assets in their portfolio. The treasury bills (TBILLS) also show to have a strong and negative impact on bank capital, and the investment of domestic banks in government securities requires holding less capital. The credit risk (CREDRISK) has a negative effect on capital in all presented models, with a significant effect in one of these models. This suggests that the deterioration of the quality of loan portfolio weakens bank capital.[13] Thus, the first 2 variables representing the effect of capital regulation (RISKY and TBILLS) show that regulatory capital requirements are significantly binding and have a strong impact on domestic banks behaviour. Domestic banks do adjust their capitalisation level according to their risky assets (e.g. loans, investments, etc) and risk-free assets (i.e. T-bills). Nevertheless, those banks do not boost their capital to confront the deterioration of credit risk.

Deposit growth shows to have a significant negative influence on domestic bank capital, which suggests the existence of moral hazard problem, where banks rely on deposits to lower their capital. Institutional ownership (INST) shows a positive correlation with capital in all models, with significant effects in 2 out the 6 presented models. This means that banks with institutional ownership have higher capital and have superior ability than family owned banks to increase it. Our empirical results give support for the signalling theory among domestic banks, where they use their capitalisation level as a sign of confidence to depositors and other stakeholders. Finally, the cyclicality of domestic bank capital is obvious according to the reported results. Bank capital is positively correlated with GDP growth and thus, domestic banks do adjust their capital according to the economic cycle.

7.3 The Determinants of Foreign Bank Capital

In this section, we include the subsidiaries of foreign banks to detect the factors that shape their capitalisation level. The results are reported in Table 5. The presented models are satisfactory for estimating the determinants of foreign bank capital since they generate adjusted R-squared that range between 85% and 89%. Besides, the F-statistics show the significance of these models.

Similarly to domestic banks, the profitability of foreign banks does not show to have any effect on their capitalisation. But in contrast to domestic banks, the volatility of earnings does not have any impact on foreign bank capital. Therefore, foreign banks do not rely on profits, and can obtain the needed capital from their parent company when needed.

Also similarly to domestic banks, SIZE has a negative and significant effect, which shows that larger foreign banks hold lower capital than smaller ones. Foreign banks share the domestic banks the moral hazard matter.

Surprisingly, we find a negative correlation between the share of risky assets and foreign bank capital. Additionally, the relationship between TBILLS and CAP is insignificant. These findings may suggest that foreign banks do not adopt Basel Accord rules (I and II) that state that banks must set their capital according to the level of risky and risk-free assets. This may raise question on how much the host market regulatory capital requirements are binding for foreign banks. On the other hand, CREDRISK has a significant negative effect in one of the presented models.

[13] Our finding contradicts several papers, such as Dahl and Shierves (1990), Shierves and Dahl (1992), and Berger and Deyoung (1997), who found a positive correlation between credit risk and bank capital.

Table 5: The determinants of foreign bank capital

	(1)	(2)	(3)	(4)	(5)	(6)
C	44.17***	36.43***	34.21***	5.31***	2.89	29.23***
	(7.35)	(6.44)	(6.35)	(1.09)	(2.36)	(6.88)
ROA	0.12	0.16	0.14		0.22	
	(0.17)	(0.17)	(0.16)		(0.19)	
SD (ROA)	0.23	0.26		0.21		
	(0.19)	(0.19)		(0.19)		
SIZE	-3.48***	-3.03***	-2.72***			-1.85***
	(0.58)	(0.55)	(0.53)			(0.53)
RISKY	-0.05**		-0.009		-0.02	
	(0.02)		(0.02)		(0.02)	
DEP	-0.04***	-0.04***	-0.04***	-0.04***		
	(0.006)	(0.006)	(0.06)	(0.006)		
CREDRISK	-0.008**	-0.004		-0.001		-0.0002
	(0.003)	(0.003)		(0.003)		(0.003)
TBILLS		-0.01		-0.02		-0.02
		(0.03)		(0.03)		(0.03)
SIGNAL	0.08	1.09	0.49		0.38	
	(0.29)	(2.29)	(0.28)		(0.28)	
GDPG	0.05	0.04		0.02	0.008	
	(0.07)	(0.08)		(0.08)	(0.08)	
Adj.-R^2	0.8877	0.8854	0.8840	0.8684	0.8498	0.8546
Obs.	249	249	254	249	254	249
F-statistic	68.63	67.12	75.19	63.95	58.26	61.75
Prob(F-stat.)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hausman test						
χ^2 statistic	75.8738	68.6285	69.1073	73.0583	70.1662	65.3587
Prob(χ^2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

***Notes*:**
Standard error in parentheses.
*** Significantly different from zero at the 1% level.
** Significantly different from zero at the 5% level.
* Significantly different from zero at the 10% level.

Interestingly, we notice that foreign banks do not use their capital level as a sign of confidence to depositors and other stakeholders. This is shown by the insignificant correlation between CAP and SIGNAL. Thus, foreign banks may rely on their reputation and not their capitalisation to attract customers. We finally observe that GDPG does not have any effect on foreign bank capital. This suggests that the cyclicality of bank capital does not apply to foreign banks. This is a very interesting result since it shows that foreign banks do not adjust their capital according to the host market economic conditions.

8. Conclusion

The literature on bank capital proposes several propositions: the reaction of banks to capital requirements, the signalling theory, the too-big-to-fail theory, the cyclicality of bank capital theory,

etc… Studies on bank capital have analysed the determinants of bank capital regardless of the ownership of banks (i.e. domestic or foreign). Besides, those studies look at the reaction of banks to tighter capital requirements without taking into consideration the effect of ownership. In this study, our aim was to analyse the determinants of bank capital, taking into account the effect of ownership (foreign vs. domestic and institutional vs. family-owned). Additionally, we tried to find out if the regulatory capital requirements or the market capital requirements are more important for banks in setting the level of capitalisation. Several interesting results have emerged.

We found that the reaction of domestic banks to capital requirements differs from that of foreign banks and regulatory capital requirements are clearly more binding for domestic banks. Nevertheless, domestic banks do consider the importance of market capital requirements. For instance, they use their capitalisation level to send signals to markets. Conversely, foreign banks do not use this tool and may rely solely on the reputation of their parent company.

Regarding the effect of ownership, we found that foreign banks hold lower capital and the institutional ownership of domestic banks results in a higher capitalisation.

Finally, we found that in contrast to domestic banks, foreign bank capital does not follow the host market economic cycle. Therefore, the cyclicality of bank capital does not apply for foreign bank. This may suggest that the international and local regulatory authorities have to consider this in adopting the countercyclical buffers on internationally active banks.

Appendix A: Calculation of Control Variables

Variable	Description
CAP	Equity-to-asset ratio
ROA	After tax net income divided by average assets
SD(ROA)	The standard deviation of ROA for the last 3 years
SIZE	Natural log of assets
DEP	Costumer deposit growth (percentage)
RISKY	Total assets – (cash and central bank + T-bills + deposits with head office and branches) divided by total assets
CREDRISK	Provisions for doubtful loans divided by gross loans
TBILLS	T-bills-to-asset ratio
INST	Dummy variable (1 for institutional ownership, zero otherwise)
FOREIGN	Dummy variable (1 for foreign banks, zero otherwise)
SIGNAL	Total sector equity-to-asset ratio
GDPG	Real GDP growth (percentage)

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