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Cyclical Effects of Bank Capital Buffers with Imperfect Credit Markets: international evidence[*]

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Abstract

This paper analyzes the cyclical effects of bank capital buffers using an international sample of 2,361 banks from 92 countries over the 1990-2007 period. We find that capital buffers reduce the bank credit supply but – through what could be "monitoring or signaling effects" – have also an expansionary effect on economic activity by reducing lending and deposit rate spreads. This influence on lending and deposit rate spreads is more pronounced in developing countries and during downturns. The results suggest that capital buffers have a counter-cyclical effect in these countries. Our data do not suggest differences in the cyclical effects of capital buffers between Basel I and Basel II.
Keywords: capital regulation, cyclical effects, developing countries, interest rates, panel data
JEL Classification: E32, E44, G21, G28.

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1. Introduction

Bank capital regulation is the most traditional pillar for regulators and supervisors to control bank-risk taking and foster financial stability all over the world.[1] In addition to efficiently increasing financial stability, one of the most discussed effects of capital regulation is its cyclical effect. This discussion has sparked greater interest since the adoption of Basel II and with the current financial crisis.

As Basel II creates a closer link between capital requirements and risk, it makes capital requirements more dependent on the business cycle. In a cyclical downturn, when asset prices start declining, banks may be forced to undertake continuous writedowns (accompanied by increased provisioning), and this raises their need for capital. Capital requirements may therefore increase in a cyclical downturn. If banks are highly leveraged and capital becomes difficult to raise and/or costly, banks might have to reduce their loans, and the subsequent credit squeeze might add to the downturn, making the recession deeper. Similarly, during an economic upturn, the amount of capital required decreases and the credit supply increases, making the economic upturn more marked. These intuitive arguments suggest that capital requirements are pro-cyclical and that Basel II is more pro-cyclical than Basel I.

The cyclical effects of capital regulation may, however, be lower when capital regulations are not binding. Recent empirical evidence shows that most banks keep capital buffers which, in some cases, are quite significant (Ayuso *et al*., 2004; Nier and Bauman, 2006; Flannery and Rangan, 2008; Fonseca and González, 2009). Capital buffers may even be counter-cyclical if banks tend to increase them, and then reduce their credit supply, during upturns. In this case, banks might be making use of capital buffers to offset—at least partially—the negative effects of pro-cyclical requirements. In contrast, capital buffers may increase the pro-cyclical effects of capital regulation if banks decrease them, and then increase their credit supply, during upturns. All this implies that the management of bank capital buffers over the course of the business cycle might be as important, or even more so, as rules-based capital requirements in determining the cyclical impact of capital regulation.

Empirical evidence on the relation between capital buffers and the business cycle is not conclusive and varies across countries, suggesting a negative relation in developed countries and a less clear relation in developing countries. Ayuso *et al.* (2004),

[1] Over 100 countries implemented the 1987 Basel I Accord, which focuses on bank capital regulation (Barth *et al*., 2004). The Basel II Accord continues to consider bank capital regulation as one of its three pillars (Pillar 1), alongside official supervision (Pillar 2) and market discipline (Pillar 3).

Lindquist (2004) and Stoltz and Wedow (2005) find a negative relationship between capital buffers and the cycle variables for Spanish, Norwegian, and German banks respectively. Similarly, Bikker and Metzemakers (2004) and Jokipii and Milne (2009) find a negative relationship between capital buffers and the cycle for 29 OECD and the EU15 countries. This negative co-movement might exacerbate the pro-cyclical impact of bank capital requirements. Jokipii and Milne (2009) find opposite results for the 10 accession countries that joined the European Union in 2005. This positive co-movement might reduce the pro-cyclical impact of bank capital requirements. Fonseca and González (2010) also find different patterns across countries. They find a negative relation between economic cycle and capital buffers in seven countries – Chile, Denmark, France, Indonesia, the Philippines, the UK, and the US. In 5 countries – Brazil, Hong Kong, India, Italy, and Romania – there is a positive relation. They do not find a statistically significant relation between capital buffer and the business cycle in the remaining 59 countries.

The above literature assumes that higher capital buffers reduce banks' credit supply and have a contractionary effect on economic activity. This suggests that a negative (positive) relation between capital buffers and the cycle might exacerbate (reduce) the pro-cyclical effects of capital regulation. Capital buffers, however, may have additional effects on the business cycle if they influence the lending and deposit rate spreads (Meh and Moran, 2009; Agénor and Pereira da Silva, 2009a; Agénor *et al.,* 2009). There may be a negative relation between capital buffers and lending rate spreads if capital buffers induce banks to screen and monitor borrowers more carefully or if the switching costs for borrowers are relevant. In such cases, bank capital may play a significant cyclical role that has not yet been empirically analyzed: the higher the capital buffer, the lower the lending rate spread and the greater the expansionary effect on economic activity. This expansionary effect of bank capital buffers through the reduction of lending spreads is in contrast to the reduction effect associated to date with a lower credit supply.

Moreover, there may be a negative relation between capital buffers and deposit rate spreads in the presence of market discipline by depositors or if capital represents a signal that the bank's financial position is strong, so that it reduces the intensity of regulatory scrutiny. In this case, a higher capital buffer would reduce the deposit rate, tending today to increase consumption through intertemporal substitution. The result is an expansion of economic activity. This expansionary effect of bank capital buffers through the reduction of deposit rate spreads contrasts again with the contractionary effect associated to date with a lower credit supply.

The theoretical opposing effects of capital buffers on the business cycle increase the relevance of empirical analysis. The cyclical effects of capital buffers through their influence on lending and deposit rate spreads have been theoretically suggested by Agénor and Pereira da Silva (2009a), and Agénor *et al.* (2009) but, to our knowledge, not empirically tested. In this paper, we address this question empirically for a set of international bank data from developed and developing countries. Using standard econometric panel data techniques, we build an incomplete panel of 2,361 banks from 92 countries over the 1990-2007 period and control for the endogeneity of explanatory variables and unobservable bank effects.

We make several contributions. First, we analyze the influence of capital buffers and risk-adjusted capital ratios on lending and deposit spreads in an international bank database. This is a novelty of our paper because literature analyzing the lending channel of bank capital has focused on the effect of capitalization on loan growth.[2]

To our knowledge, Lown and Peristiani (1996), Hubbard *et al.* (2002), and Coleman *et al.* (2002) provide evidence of a negative relation between bank capital and lending interest rates for the U.S. They do not provide evidence outside the U.S and focus on capital ratios instead of capital buffers. Capital buffers might, however, be more important than capital ratios as determinants of the cyclical effects of capital regulation because they internalize if capital requirements are binding or not.[3] For that reason, we focus on capital buffers as a better proxy of bank financial health, but also provide evidence on risk-adjusted capital ratios to allow comparison with existing literature. Regarding the relation between bank capital and the cost of deposits, Demirgüc-Kunt and Huizinga (2004) provide evidence on an international set of banks from 30 countries, suggesting that banks with higher capital ratios pay lower interest rates for deposits. However, they do not focus on capital buffers or the cyclical effects of capital regulation.

Second, we directly analyze the cyclical effects of capital buffers by analyzing their influence on the relation between the business cycle and, respectively, lending and deposit rate spreads. Higher capital buffers promoting a more negative (positive) relation between the business cycle and the lending rate spread can be expected to

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[2] Hancok *et al*. (1995), Thakor (1996), and Kishan and Opiela (2000), among others, emphasize the importance of bank capital on lending behavior in the U.S. Altumbas *et al*. (2002) and Gambacorta and Mistrulli (2004) provide evidence for Europe.

[3] Previous studies use the capital ratio as a proxy negatively related to bank risk. However, when the minimum capital required is adjusted to bank risk, the capital ratio may be positively related to bank risk if the requirement is binding.

provide evidence on its pro-cyclicality (counter-cyclicality). In this case, the lower (higher) lending rate spreads that capital buffers promote during upturns might increase (reduce) the expansion of economic activity by expanding investment by firms. In the same way, higher capital buffers promoting a more negative (positive) relation between the business cycle and the deposit rate spread might provide evidence on its pro-cyclicality (counter-cyclicality). In this case, the lower (higher) deposit rate spreads that capital buffers promote during upturns might increase (reduce) the expansion of economic activity by expanding consumption-depending on the degree of intertemporal substitution. Previous studies have focused on how capital buffers vary over the business cycle, assuming that capital buffers reduce economic activity through a reduction of the credit supply. To our knowledge, there are no studies analyzing and testing the potential expansionary effect of capital buffers through a reduction in interest rate spreads.

Third, we compare the cyclical effects of capital buffers between developed and developing countries. Much of the analytical and empirical work on the cyclicality of capital regulatory regimes focuses largely on industrialized countries and therefore does not account for the type of financial market imperfections that middle-income developing countries face. Agénor and Pereira da Silva (2009a) suggest that capital buffers may play a more important role in these environments as signals to depositors of a greater commitment to screening and monitoring borrowers, because of either the absence, or the lack of credibility, of the deposit insurance system.

Fourth, we examine the differences in cyclicality between Basel I and Basel II. Most of the previous work comparing cyclical effects between Basel I and Basel II uses simulated data. To our knowledge, only Kerbl and Sigmund (2009) use realized data from Austrian banks. We use realized data from an international bank database that allows not only comparison between Basel I and Basel II in an ample dataset but also analyzes any different effects across developed and developing countries.

Finally, we consider the possibility that lending and interest rates may face adjustment costs in their moving toward their equilibrium levels by using the Generalized Method of Moments (GMM) estimator developed by Arellano and Bond (1991) for dynamic panel data. GMM models also control for the presence of unobserved bank-specific effects and the endogeneity of the explanatory variables. Lown and Peristani (1996), Coleman *et al.* (2002), and Hubbard *et al.* (2002) do not control for adjustment cost and endogeneity when they analyze the relation between capital buffers and lending interest rates in the U.S. market.

Our results indicate that well-capitalized banks are less constrained by capital requirements and charge lower interest spreads in their loans. This is in line with the results of Hubbard *et al.* (2002) for the United States. In the same way, well-capitalized banks pay lower interest spreads for their deposits. However, this influence of capital buffers on lending and deposit rate spreads varies across countries depending on their development stage and the business cycle. We find that capital buffers influence more economic activity through these two channels (lending and deposit spreads) in developing countries during downturns. The consequence is that capital buffers produce a counter-cyclical effect in these countries. We do not, however, find statistically significant differences in the cyclical effects of capital buffers between Basel I and Basel II.

The rest of the paper is organized as follows. Section 2 describes the theoretical background and discusses the hypotheses. Section 3 describes the characteristics of the dataset and the empirical methodology, while Section 4 shows the results of the cyclical effects of bank capital on lending and deposit rate spreads and how they vary between developed and developing countries. Finally, Section 5 presents our conclusions.

2. Theoretical background and hypotheses

The macroeconomic consequences of bank capital buffers have received growing interest in the debate on their cyclical effects, especially after the 2008 global financial crisis suggested the need to tame macro-financial pro-cyclicality in mature economies. An increase in bank capital buffers has traditionally been associated with a reduction in the credit supply, leading to a contractionary effect on economic activity. The literature analyzes whether bank capital buffers increase during upturns, reducing the pro-cyclicality of capital requirements, or if they decrease during upturns, increasing the pro-cyclicality of capital requirements (Ayuso *et al.*, 2004; Bikker and Metzemakers, 2004; Lindquist, 2004; Stoltz and Wedow, 2005; and Jokipii and Milne, 2009). Most of the empirical evidence finds a negative co-movement of capital buffers and the cycle for developed countries, suggesting their pro-cyclicality.

Agénor and Pereira da Silva (2009a) and Agénor *et al.* (2009) have recently suggested two additional channels through which capital buffers may have cyclical effects. They may: 1) influence investment by firms by affecting lending rate spreads; and 2) influence consumption by households by affecting deposit rate spreads.

Bank capital buffers may reduce bank lending spreads for at least two reasons. First, bank capital may induce banks to screen and monitor borrowers more carefully. Meh and Moran (2008) develop a model where banks lack the incentive to monitor borrowers adequately, because monitoring is privately costly and any resulting increase in the risk of loan portfolios is mostly borne by investors. This moral hazard problem is mitigated when banks are well capitalized and have more to lose from loan default. As a result, higher bank capital increases the ability to raise loanable funds and facilitates bank lending. Agénor *et al*. (2009) use the same idea in a general equilibrium model to also show that well-capitalized banks charge a lower risk premium to borrowers. Second, if a borrower faces switching costs in a relationship with an individual bank, bank-specific financial health might affect a borrower's cost of funds. In a market without information asymmetries, bank-specific increases in the cost of funds would not be passed on to loan customers because borrowers could simply switch banks. With information asymmetries, however, borrowers face switching costs in changing lenders and hence an idiosyncratic increase in banks' cost of funds might increase the cost of funds to borrowers. If higher capital buffers reduce bank's cost of funds, well-capitalized banks might charge lower risk premium to borrowers and increase investment.

There is empirical evidence for the U.S consistent with capital-constrained banks charging higher spreads on their loans (Hubbard *et al.*, 2002, Coleman *et al.*, 2002). Lown and Peristiani (1996), moreover, find that undercapitalized banks contributed to the 1990 credit slowdown in the U.S. by charging consumers a higher-than-average loan rate relative to better-capitalized institutions. Empirical evidence outside U.S and/or analyzing capital buffers is, to our knowledge, not available.

A second channel through which capital buffers might influence economic activity is by influencing deposit interest spreads and, consequently, consumption. Several empirical studies, mostly for the U.S., find a negative relation between the cost of deposits and the capital ratio (Ellis and Flannery, 1992; Cook and Spellman, 1994; Flannery and Sorescu, among others). Demirgüc-Kunt and Huizinga (2004) find that the negative relation remains on average in a sample of banks from 30 countries. This evidence is generally interpreted as consistent with market discipline in the deposit market. Agénor and Pereira da Silva (2009a) also explain the negative relation through a signaling effect when households internalize the fact that more capital increases banks' incentives to screen and monitor their borrowers. Depositors are, therefore, willing to accept a lower, but safer, return. The strength of this bank capital channel, which operates through the deposit rate, depends on the presence and the magnitude of an intertemporal substitution effect on consumption.

The above arguments lead us to establish the first hypothesis:

> *H.1. Capital buffers reduce the interest rate spreads that banks charge for loans and the interest rate spreads they pay for deposits.*

2.1. Developed vs. developing countries

Most existing studies on the cyclicality of capital regulatory regimes, both theoretical and empirical, are based on industrialized countries. However, the pervasiveness of financial market imperfections in developing countries, coupled with their greater vulnerability to shocks, warrant a focus on the potential different cyclical effect of capital buffers in these countries. For middle-income countries, in particular, these imperfections cover a broad spectrum: underdeveloped capital markets; limited competition among banks; more severe asymmetric information problems, which make screening out good from bad credit risks difficult and foster collateralized lending; a pervasive role of government in banking; uncertain public guarantees; inadequate disclosure and transparency, coupled with weak supervision and a limited ability to enforce prudential regulations; weak property rights and an inefficient legal system, which make contract enforcement difficult and also encourage collateralized lending; and a volatile economic environment, which increases exposure to adverse shocks and magnifies both the possibility of default by borrowers and the risk of bankruptcy for financial institutions.

The higher degree of market imperfections in developing economies may then magnify the above-mentioned role that bank capital buffers play in loan and deposit markets. Greater information asymmetries increase switching costs in bank relationships and/or the cost for banks of screening and monitoring borrowers. In this case, capital has a stronger effect by signaling to depositors that there will be greater supervision of borrowers. The above reasons favor a greater negative relation in developing countries between capital and both lending and deposit rate spreads. Thus our second hypothesis is:

> *H.2. The negative influence of bank capital buffers on lending rates and banks' cost of deposits is greater in developing countries.*

We also expect that the negative influence of capital buffers on deposit rate spreads varies across countries depending on the presence of deposit insurance that could offset somehow the signaling effect of buffers. It has long been suggested that more generous deposit insurance weakens the market discipline enforced by depositors and encourages banks to take greater risks (Merton, 1977). Some empirical evidence confirms this effect, showing that deposit insurance increases the likelihood of banking crises (Demirgüc-Kunt and Detragiache, 2002) and that risk-shifting incentives are positively related to the generosity of deposit insurance (Hovakimian *et al.* 2003). According to this evidence, if more generous deposit insurance reduces market discipline, it will also make the cost of deposits less sensitive to bank capital. For this reason, we forecast that the negative relation between the capital buffer and the deposit rate spread will be lower in countries with explicit deposit insurance. Thus our third hypothesis is:

> *H.3. The presence of an explicit deposit insurance diminishes the ability of bank capital buffers to reduce deposit rate spreads.*

2.2. Cyclical effects of capital buffers

The influence of bank's financial health on reducing lending and deposit rate spreads may spark an expansionary effect for economic activity because they help increase, respectively, investment by firms and household consumption. This effect comes from a macro, general equilibrium perspective and is different from the financial, partial equilibrium perspective that sees a traditional contractionary effect associated with the reduction of credit supply, present in most of the previous literature links with higher capital buffers. Thus, if capital buffers are increased during an expansion with the initial objective of being counter-cyclical, they may actually turn out to be pro-cyclical if the reduction in loan and deposit rate spreads outweighs the reduction of credit supply. These opposing effects make the analysis of the cyclical effects of capital buffers an empirical question.

Moreover, the influence of capital buffers on lending and deposit rate spreads might vary over the business cycle and among developed and developing countries. If existing information asymmetries become more pronounced during periods of financial distress, we can expect higher capital buffers to induce a higher reduction in interest rates (loans and deposits) during downturns. Aditionally, during downturns capital requirements are more binding and differences in bank capital across banks are more relevant. Poorly capitalized banks becomes more capital constrained during downturns and might charge higher spreads on loans relative to better capitalized banks. Consistent with this behavior, Lown and Peristiani (1996) find surrounding the 1990 credit slowdown in the U.S. that the correlation between capital and loan rates in the U.S. became increasingly more negative in 1989 and only started to narrow roughly a year after the end of the recession. Thus, if the expansionary effects associated with higher capital buffers are higher during downturns than in upturns, we can even expect a counter-cyclical effect for capital buffers.

As information asymmetries are greater in developing countries, we expect capital buffers to be more counter-cyclical (less pro-cyclical) in these countries. Thus, our fourth hypothesis is

> *H.4. Capital buffers are more counter-cyclical (less pro-cyclical) in developing countries.*

3. Database and econometric model

3.1. Database

We obtain consolidated bank balance-sheet and income-statement data (in US dollars and in real prices) from the Fitch-IBCA Ltd. BankScope Database for 1990-2007. Our starting point is the 152 countries included in the World Bank's Bank Regulation and Supervision database, for which information about bank capital requirements is available. We eliminate 55 countries because of the lack of data in Bankscope to calculate bank explanatory variables for at least three consecutive years and five countries because we do not have information on bank concentration and the growth of GDP per capita. The final sample covers 92 countries.

3.2. Econometric model

We apply the generalized method of moments (GMM) estimator developed for dynamic models of panel data by Arellano and Bond (1991). This methodology is specifically designed to address three relevant econometric issues: (1) the presence of unobserved bank-specific effects, which are eliminated by taking first-differences of all variables; (2) the autoregressive process in the data regarding the behavior of interest rate spreads (i.e., the need to use a lagged dependent variables model to capture the dynamic nature of the interest rate spread); and (3) the likely endogeneity of the explanatory variables. The panel estimator controls for this potential endogeneity by using instruments based on lagged values of the explanatory variables.

Our basic models to estimate the influence of capital buffer on lending and deposits rate spreads are:

$$LOANRATE_{i,t} = \alpha_0 + \alpha_1 \text{LOANRATE}_{i,t-1} + \alpha_2 \text{BUFFER}_{i,t} / \text{CAPITAL}_{i,t} + \alpha_3 \text{BANK}_{i,t} + \alpha_4 \text{CONC}_{j,t} + \alpha_5 \text{GDPGR}_{j,t} + \\ + \alpha_6 \sum_{j=1}^{92} \text{Country}_j + \alpha_7 \sum_{t=1990}^{2007} \text{T}_t + \nu_i^L + \varepsilon_{it}^L \quad [1]$$

$$COSTDEP_{i,t} = \beta_0 + \beta_1 \text{COSTDEP}_{i,t-1} + \beta_2 \text{BUFFER}_{i,t} / \text{CAPITAL}_{i,t} + \beta_3 \text{BANK}_{i,t} + \beta_4 \text{CONC}_{j,t} + \beta_5 \text{GDPGR}_{j,t} + \\ + \beta_6 \sum_{j=1}^{92} \text{Country}_j + \beta_7 \sum_{t=1990}^{2007} \text{T}_t + \nu_i^D + \varepsilon_{it}^D \quad [2]$$

where $\text{LOANRATE}_{i,t}$ is the average spread of loan rates for bank i in year t. We measure it as the ratio of interest income to total earning assets minus the government interest rate. The government rate is the Treasury bill rate where available; otherwise, it is the discount rate.[4]

$\text{COSTDEP}_{i,t}$ is the average spread of deposit rates for bank i in year t. We follow Demirgüc-Kunt and Huizinga (2004) to define it as the ratio of interest expense to interest-bearing debt of the bank minus the government interest rate. The government rate is the Treasury bill rate where available; otherwise, it is the discount rate.

The importance of adjustment costs is captured by using a partial adjustment model that includes the first lag of the dependent variable ($\text{LOANRATE}_{i,t-1}$ and $\text{COSTDEP}_{i,t-1}$). A positive and significant coefficient for this variable would indicate that adjustment costs are relevant.

$\text{BUFFER}_{i,t}$ is the capital buffer for bank i in year t. We measure capital buffers in relative and absolute terms. RBUFFER is the relative capital buffer, i.e., the difference between capital and the requirement divided by the requirement. ABUFFER is the absolute capital buffer measured as the difference between capital and the requirement. To save space, we only report results measuring capital buffers in relative terms (RBUFFER). The results do not change when we measure buffers in absolute terms.

$\text{CAPITAL}_{i,t}$ is the capital of bank i in year t divided by its risk-weighted assets. We include CAPITAL as an alternative to BUFFER to analyze differential effects bweteen capital buffers and total capital ratios. This analysis also allows us to compare our results with existing literature focusing on total capital ratios. Capital ratios, requirements, and capital buffers by country are reported in Table 1. Figure 1 shows the

[4] Agénor and Pereira da Silva (2009a) and Agénor *et al.* (2009) define the spread in terms of differences with respect to the central bank policy rate. Our empirical approach fits to its theoretical analysis.

evolution of relative capital buffers and risk-adjusted capital ratios for developed and developing countries over the 1989-2007 period. Banks in developing countries hold on average larger capital buffers and differences in RBUFFER and CAPITAL are statistically significant, at least at the 10 per cent level, in 10 and 12 years, respectively.

BANK includes a set of bank-specific characteristics: size, collateral, liquid asset, and loans. We control for the influence of bank size (SIZE) for several reasons. Big banks might be thought to have smaller buffers if, as the “too-big-to-fail” hypothesis suggests, they believe that they will receive support from the regulator in the event of difficulties, or if they have lower risk as a consequence of the enhanced diversification of their asset portfolio. These arguments predict a negative coefficient for SIZE. We use the natural logarithm of total bank assets as a measure of bank size.

We also include the percentage of loans with collateral (COLLATERALTA), the percentage of liquid assets (LATA), and the percentage of total loans (TLNTA) to total bank assets. Although not reported, we check that results do not vary when we include non-performing loans and allowance for loan loss as additional bank control variables. The inclusion of these two variables, however, reduced our bank sample due to lack of data.

$CONC_{j,t}$ is the bank market concentration of country j in year t. If market concentration is a proxy of market power we expect to find positive coefficients for CONC to explain lending rate spreads, and negative coefficients in the deposit rate spreads equation. We measure bank concentration as the fraction of bank assets held by the three largest commercial banks in a country. This variable comes from the Beck *et al*. (2009) database.

Annual growth in real per capita gross domestic product (GDPGR) is included to control for the potential cyclical behavior of loan and deposit rates. A negative relation between loan rates and the growth of real per capita gross domestic product offers support for a pro-cyclicality of interest rates. Data on GDP growth come from the International Financial Statistics of the IMF.

A set of dummy country variables ($\sum_{j=1}^{92} Country_j$) is included to control for country-specific characteristics, and a set of dummy time variables ($\sum_{t=1990}^{2007} T_t$) captures any unobserved bank-invariant time effects not included in the regression. Finally, ν is an unobservable bank-specific effect, which is assumed to be constant over time; and ε_{it} is the white noise error term.

We control for the potential endogeneity of BUFFER, CAPITAL, COLLATERALTA, LATA, TLNA, CONC, and GDPGR in the GMM estimations using two-to-four period lags of the same variables as instruments. We use one-step estimation and specify the robust estimator of the variance-covariance matrix of the parameters. We also examine the hypothesis that there is no second-order serial correlation in the first-difference residuals (*m2*). In our models this hypothesis is not rejected. First-order serial correlation (*m1*) in the differentiated residuals is attributable to the first difference of models.

To analyze the cyclical effects of capital buffers, we study how they influence the relation between the business cycle and interest rate spreads. To do it, we include in the regressions the interaction between BUFFER/CAPITAL and GDPGR. In our models, first, a negative relation between the growth of GDP and the interest rate spreads would imply pro-cyclicality (lending and deposit spreads fall during booms and increase during downswings). Then, a positive (negative) coefficient for the interaction BUFFER/CAPITALxGDPGR would imply that bank capital reduces (increases) the pro-cyclicality. The models are:

$$LOANRATE_{it} = \gamma_0 + \gamma_1 \text{LOANRATE}_{it-1} + \gamma_2 \text{BUFFER}_{it}/\text{CAPITAL}_{it} + \gamma_3 \text{BANK}_{it} + \gamma_4 \text{CONC}_{jt} + \gamma_5 \text{GDPGR}_{jt} + \\ + \gamma_6 \text{BUFFER}_{it}/\text{CAPITAL}_{it} \text{ x GDPGR}_{jt} + \gamma_7 \sum_{j=1}^{92} \text{Country} + \gamma_8 \sum_{t=1990}^{2007} \text{T}_t + \nu_i^L + \varepsilon_{it}^L \quad [3]$$

$$COSTDEP_{it} = \delta_0 + \delta_1 \text{COSTDEP}_{it-1} + \delta_2 \text{BUFFER}_{it}/\text{CAPITAL}_{it} + \delta_3 \text{BANK}_{it} + \delta_4 \text{CONC}_{jt} + \delta_5 \text{GDPGR}_{jt} + \\ + \delta_6 \text{BUFFER}_{it}/\text{CAPITAL}_{it} \text{ x GDPGR}_{jt} + \delta_7 \sum_{j=1}^{92} \text{Country} + \delta_8 \sum_{t=1990}^{2007} \text{T}_t + \nu_i^D + \varepsilon_{it}^D \quad [4]$$

Mean values by country of the variables used in the paper are reported in Panel A of Table 1. Correlations in Panel B show that capital buffers in relative and absolute terms are highly correlated (correlation of 0.985). Loan and deposit rates correlate positively with capital buffers (absolute and relative), collateral, liquid assets, and bank concentration. Loan and deposit rates, however, correlate negatively with total loans and growth in real per capita GDP.

INSERT TABLE 1 ABOUT HERE

4. Empirical results

4.1. The bank lending and deposit channels of capital buffers

This section analyzes whether capital buffers and risk-adjusted capital ratios influence lending and deposit rate spreads in our international bank dataset. Panel A of Table 2 reports the results for the influence of bank capital on lending rate spreads. Panel B reports the results for the influence of bank capital on bank deposit rate spreads. The non-significance of the m_2 statistic indicates no second-order serial correlation in the first-difference residuals. These are the conditions required for consistency of the GMM estimates.[5] The lagged dependent variables have positive coefficients in all estimations, confirming the relevance of adjustment cost in the movement of lending and deposit rates and the appropriateness of using GMM estimations.

Results in columns (1) to (4) indicate that the effect of capital on lending interest spreads is always negative and statistically significant. The results are similar using both capital buffers and risk-adjusted capital ratios. This suggests that well-capitalized banks are less constrained by capital requirements and charge lower interest spreads in their loans. This result is consistent with the evidence for the United States reported in Hubbard *et al.* (2002), which suggests that the capital position of individual U.S. banks negatively affects the interest rate at which their clients borrow, and in Coleman *et al.* (2002), who found that capital-constrained banks charge higher spreads on their loans.

Bank control variables have the expected influence on lending rate spreads. Although coefficients are not statistically significant, higher values of collateral reduce lending rate spreads. A higher percentage of liquid assets is associated with higher lending rate spreads. The ratio of total loans to total bank assets does not have statistically significant coefficients. Bank concentration has positive coefficients, although only one is statistically significant in column (1), consistent with a greater negotiation power of banks in more concentrated markets. We do not obtain significant coefficients for growth in per capita GDP.

INSERT TABLE 2 ABOUT HERE

[5] The absence of first-order serial correlation in the first-difference residuals indicated by the non-significant values of m_1 in some estimation suggests that errors in levels follow a random walk. This fact does not affect the consistency of the GMM estimates in the first-difference model (Arellano and Bond, 1991).

The negative and statistically significant coefficients of RBUFFER and CAPITAL in columns (5) to (8) indicate that well-capitalized banks pay lower interest spreads for their deposits. This result is consistent with Demirgüc-Kunt and Huizinga (2004) when, in an international database of banks from 30 countries, they find that, on average, safer banks pay lower interest rates for deposits. It suggests the presence of market discipline or a positive signaling effect for bank capital.

Bank control variables have the expected influence on deposit rates. The negative coefficients for size are consistent with a lower risk for large banks. Big banks may have a lower cost of deposits if, as the "too-big-to fail" hypothesis suggests, depositors believe that they will receive support from the regulator in the event of difficulties, or if they have greater opportunities of asset portfolio diversification. Other bank control variables and market concentration do not have statistically significant coefficients. Finally, we obtain negative coefficients for growth in per capita GDP, suggesting that banks pay lower spreads in deposit rates during upswing periods.

4.2. Developed vs. Developing countries

We now analyze whether there are differences in the two bank capital channels across countries depending on the level of development. We sequentially include an interaction term between capital buffers (total capital ratios) and dummy variables capturing the country's development. We use several dummy variables: DEVELOP takes a value of 1 for countries classified as high income and upper middle income and zero for countries classified as low income and lower middle income;[6] OECD takes a value of 1 for OECD countries and zero otherwise; G20 takes a value of 1 for countries belonging to the G20 group and zero otherwise; and G8 takes a value of 1 for countries belonging to the G8 group and zero otherwise. The inclusion of country dummies avoids the need for dummy development variables to enter the regression on their own and allows us to focus only on their interaction terms. Results are reported in Table 3 for the lending rate and in Table 4 for the cost of deposits.

In Table 3, we obtain positive coefficients for the interaction terms RBUFFERxDEVELOP and RBUFFERxOECD whereas RBUFFER keeps the negative and statistically significant coefficients found in estimations of Table 2. We even obtain more statistically significant results when we use the risk-adjusted capital ratio instead of the capital buffer as proxy of bank's financial health. This indicates that the negative

[6] Economies are divided according to GNI per capita, calculated using the World Bank's Atlas method. Low income and middle income economies are sometimes referred to as developing economies.

relation between capital buffers (risk-adjusted capital ratios) and lending rate spreads found on average for our sample disappears in developed and OECD countries. It suggests that it is in developing countries where well-capitalized banks charge lower interest rate spreads in loans, i.e., where the bank's financial health has a greater influence on lending rates. We do not, however, obtain statistically significant coefficients for interaction terms of countries belonging to the G20.

The greater sensitivity of lending rate spreads to banks' financial health in developing countries is consistent with the presence of higher market imperfections in these countries and a weaker institutional environment. The more severe asymmetric information problems, weaker institutions, and the absence of financial safety net, all of which usually characterize developing countries, may give rise to higher switching costs for borrowers in bank relationships or to a lower ability of banks to diversify risk. Both factors may explain why lending rates are more dependent on banks' financial health and why there is a higher negative relation between bank capital buffers and loan rate spreads.

We directly test the influence of the institutional environment in columns (5) and (8). We use the KKZ index (KKZ) calculated by Kaufman *et al*. (2001) as the average of six indicators (voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption) as a proxy of the quality of a country's institutional environment. The positive and statistically significant coefficients of RBUFFERxKKZ and CAPITALxKKZ confirms that the effect of capital on reducing lending rate spreads is stronger in less-developed institutional environments.

INSERT TABLE 3 ABOUT HERE

Results in Table 4 show a positive and statistically significant coefficient for the interaction between RBUFFER/CAPITAL and the dummy for OECD countries. We do not obtain statistically significant coefficients for the remaining interaction terms (DEVELOP, G20, and G8). This indicates that the positive signaling effect to depositors of larger capital buffers or capital ratios is higher in non-OECD countries. Again, the higher market imperfections in non-OECD countries may lead capital buffers to play a more important role by helping banks convey a signal to depositors regarding their commitment to screening and monitoring their borrowers, thus raising deposits at a lower cost. The positive and statistically significant coefficients for the interaction between RBUFFER/CAPITAL and KKZ in columns (5) and (11) confirm that bank capital plays a more relevant role to reduce the cost of deposits in less developed institutional environments.

In columns (6) and (12) we test whether the presence of explicit deposit insurance in a country diminishes the ability of bank capital to reduce deposit rate spreads (H.3). We include an interaction between RBUFFER/CAPITAL and a dummy variable (INS) that takes a value of 1 if the country has explicit deposit insurance a zero otherwise. Deposit insurance data come from Demirgüc-Kunt *et al*. (2005).

We do not obtain statistically significant coefficients for RBUFFERxINS and CAPITALxINS. Thus, our results do not suggest that the effect of bank capital to reduce the cost of deposits is stronger when a country does not have explicit deposit insurance. Bank control variables, market concentration, and growth in per capita GDP have similar coefficients to those reported in Table 2.

INSERT TABLE 4 ABOUT HERE

4.3. Cyclical effects of capital buffers: lending rates and cost of deposits

We now analyze the cyclical effects of capital buffers by focusing on their influence on the relationship between growth in GDP per capita and, respectively, lending and deposit rate spreads.

A higher (lower) reduction (increase) in lending rate spreads when GDP grows favors investment by firms and helps make the upturn more marked. So capital buffers would be pro-cyclical (counter-cyclical) when they promote a more negative (positive) relation between GDP growth and lending rate spreads. To test whether GDP effects on lending rate spreads are equal among banks with different capital ratios we introduce in the estimations an interaction term between capital buffer and per capita GDP growth. Results are reported in Panel A of Table 5.

The interaction term between capital buffer and GDP growth is positive and statistically significant whereas the negative coefficients of RBUFFER increase compared to those reported in Panel A of Table 2. This indicates that the reduction in lending rate spreads associated with well-capitalized banks is higher during downturns and decreases, or even disappears, during upturns. This asymmetric influence of capital buffers on lending rate spreads depending on business cycle makes them counter-cyclical. An increase in capital buffers during downturns (negative growth in GDP per capita) decreases loan rate spreads and, consequently, reduces the initial downturn. This result is consistent with an expansionary effect of capital buffers during downturns because the increased benefits of bank screening and monitoring in lending activity outweigh, in well-capitalized banks, the reduction in credit supply. During upswings (positive growth in GDP per capita), however, an increase in capital buffers also tend to increase lending spreads. This is consistent with a contractionary effect of capital buffers during upswings. It suggests that the negative effect of the reduction of credit supply associated with an increase in capital buffers outweighs, during upturns, the positive effect on lending rate spreads caused by the improvement of bank incentives to screen and monitor borrowers. Results are similar when we use the risk-adjusted capital ratio instead of the capital buffer.

This means that the credit supply of well-capitalized banks is less dependent on the business cycle and/or that their incentives to monitor and screen borrowers increase more during downturns. This result is consistent with Gambacorta and Mistrulli (2004), and Kwan and Eisenbeis (1997). On theoretical grounds, our findings are consistent with Flannery (1989) and Genotte and Pyle (1991), who argue that well-capitalized banks are more risk-averse and select ex ante borrowers with less probability of defaulting. This also means that when an economic downturn occurs, well-capitalized banks suffer less loan losses and their capital changes less with respect to other banks.

In Panel B of Table 5, we test the cyclical effects of capital buffers via their influence on the cost of deposits and, therefore, on consumption. We also obtain a countercyclical effect for capital buffers using the same channel. The interaction term between RBUFFER and GDPGR has positive and statistically significant coefficients in columns (5) to (8). This means that the reduction in the cost of deposits associated with a higher capital buffer decreases more the higher the growth in GDP per capita. So, during upturns, the expansionary effect of capital buffers caused by cutting back the interest paid to depositors and increasing consumption disappears. During downturns, however, the signaling effect of capital buffers is greater and helps improve economic activity by reducing bank deposit rates and thus promoting consumption. Results are again similar when we use the risk-adjusted capital ratio as proxy of bank's financial health.

INSERT TABLE 5 ABOUT HERE

Additionally, we test whether the cyclical effects of capital buffers vary depending on country development. For this purpose, we introduce sequentially triple interaction terms between RBUFFER, GDPGR, and the set of dummy variables positively correlated with the country's development: DEVELOP, OECD, G20, and G8. Table 6 reports the results for lending rate spreads and Table 7 for banks' deposit cost.

We obtain negative and statistically significant coefficients for three out of the four triple interaction terms in Table 6 (RBUFFERxGDPGRxDEVELOP, RBUFFERxGDPGRxOECD, RBUFFERxGDPGRxG8). We also obtain negative coefficients for two of the four triple interaction terms in Table 7 (RBUFFERxGDPGRxDEVELOP, RBUFFERxGDPGRxG8) when the dependent variable is the deposit rate spreads. These results indicate that the counter-cyclical effect of capital buffers disappears in developed countries. Only in developing countries did we find a significant counter-cyclical effect for capital buffers consistent with the hypothesis that the higher market imperfections in developing countries increase the benefits of capital buffers in reducing lending and deposit rate spreads. This conclusion remains valid when we use a proxy of institutional quality in a country. The negative and statistically significant coefficient of the interaction between the KKZ index and RBUFFERxGDPGR indicates that the counter-cyclical effect of capital buffers diminishes in more institutional developed countries.

Results are less significant, although similar, when we use the risk-adjusted capital ratio instead of the capital buffer in columns (6) to (10).

INSERT TABLE 6 ABOUT HERE

INSERT TABLE 7 ABOUT HERE

4.4. Basel II vs. Basel I

In this section we analyze whether the cyclical effects of capital buffers through lending and deposit rate spreads change from Basel I to Basel II since the two requirements differ vis-à-vis the role of risk. We include in the estimations a dummy variable (BASEL II) that takes the value of 1 for the 2004-2007 period and zero otherwise. It needs to be stressed that the dataset does not capture the real implementation of Basel II at a country level and that we are assuming in the period segmentation that all provisions of Basel II are indeed implemented.

First, we construct the interaction of the capital buffer and the Basel II dummy variable to know if the influence of capital buffers on lending and deposit rate spreads changes from Basel I to Basel II. The results for lending rate spreads in Panel A of Table 8 show negative, although not statistically significant, coefficients for the interaction terms of RBUFFERxBASEL II and CAPITALxBASEL II. RBUFFER and CAPITAL keep the negative and significant coefficients initially reported in Table 2. In panel B, we do not obtain statistically significant coefficients for the influence of the interaction of RBUFFERxBASEL II and CAPITALxBASEL II on banks' cost of deposits, whereas RBUFFER and CAPITAL keep, respectively, their negative influence. These results do not suggest a change in the influence of capital buffers on interest rate spreads from Basel I to Basel II subject to the caveat mentioned above.

INSERT TABLE 8 ABOUT HERE

Second, in Table 9 we analyze whether the cyclical effects of capital buffers on lending and deposit rate spreads vary from Basel I to Basel II. We include two interaction terms. RBUFFERxGDPGR indicates how the influence of capital buffers on interest rate spreads depends on the business cycle in the Basel I period (1990-2003). The triple interaction term of RBUFFERxGDPGRxBASEL II indicates how this influence changes in the Basel II period (2004-2007).

All the estimations provide positive and statistically significant coefficients for RBUFFERxGDPGR indicating that during upturns, there is a reduction in the expansionary effects on economic activity of capital buffers that exist during upturns via reduction of lending and deposit rate spreads. This asymmetric influence of capital buffers depending on the business cycle makes then counter-cyclical. We do not, however, obtain statistically significant coefficients for the interaction term of RBUFFERxGDPGxBASEL II. The non-significant coefficients for these triple interaction terms indicate that there is no difference in the counter-cyclical effect of capital buffers between Basel I and Basel II.

INSERT TABLE 9 ABOUT HERE

5. Conclusions

This paper analyzes the cyclical effects of bank capital using an international bank panel dataset of 2,361 banks from 92 countries over the 1990-2007 period. Our results suggest bank capital may influence business cycle through two channels. First, we find that well-capitalized banks are less constrained by capital requirements and charge lower interest spreads in their loans. Second, we find that well-capitalized banks also pay lower interest spreads for their deposits. The influence of bank's financial health on reducing lending and deposit rate spreads sparks an expansionary effect for economic activity because they help increase, respectively, investment by firms and household consumption. The paper tests extensively –including for different groupings of countries and stages of development—whether this effect outweights the traditional contractionary effect associated with the reduction of credit supply that most of the previous literature links with higher capital buffers. It is important to determine empirically the strength of these opposing effects since a number of official reports and academic proposals (see Agénor and Pereira da Silva (2009b) were published after the global financial crisis calling for a strengthening of prudential regulation, a more accurate evaluation of risk, and a tightening of accounting standards to reduce the perceived macro-prudential procyclicality of financial systems. These reports feature higher capital buffers prominently as a counter-cyclical device.

Regarding the relationship between lending rate spreads and capital buffers, our results suggest that buffers are counter-cyclical. An increase in capital buffers during downturns decreases loan rate spreads and, consequently, mitigates the initial downturn by supporting investment; during upswings an increase in capital buffers tend to increase lending spreads and therefore smooths the upturn. Similarly, regarding the cyclical effects of capital buffers via their influence on the cost of deposits and ultimately on consumption, we also obtain a countercyclical effect. During upturns, the expansionary effect of capital buffers caused by a decrease of deposit rates is reduced. However, during downturns, the signaling effect of capital buffers is stronger and helps support economic activity by reducing bank deposit rates and thus promoting household consumption.

In addition, the influence of capital buffers on lending and deposit rate spreads varies across countries depending on their development and also the business cycle. We find that capital buffers influence more economic activity through these two channels (lending and deposit spreads) in developing countries during downturns. The consequence is a counter-cyclical effect for capital buffers in these countries. We do not, however, find statistically significant differences in the cyclical effects of capital buffers between Basel I and Basel II.

Therefore, the paper contributes to confirm the relevance of the bank capital channel for policy purposes. However, by identifying a stronger counter-cyclical effect in developing countries, it also alerts policy-makers and regulators that caution should be exercized when deriving international standards for bank capital requirements from the intuition of the previous partial equilibrium, developed-country centered litterature.

After all, if the counter-cyclical role of buffers is stronger in developing countries –where there was no perceived excessive growth of credit of dubious quality—and weaker in developed countries –where indeed there was--, it might mean that additional regulatory and prudential safeguards should be sought to moderate macro-financial pro-cyclicality in the developed world while careful examination of country specificity is needed not to cause unwarranted loss of output and sound credit growth in the developing world.

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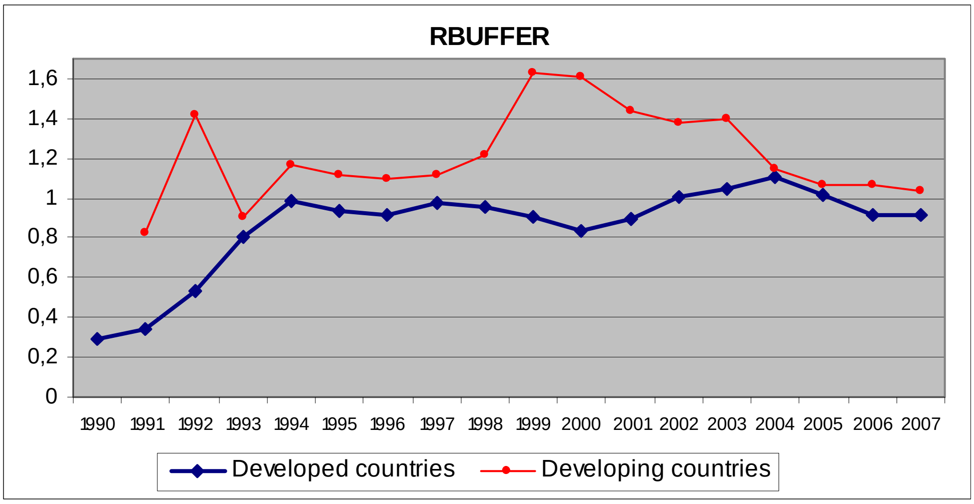
Figure 1
Capital buffers and risk-adjusted capital ratios: Developed vs. developing countries

RBUFFER is the capital buffer in relative terms, i.e., the difference between CAPITAL and the requirement divided by the requirement. CAPITAL is the total capital adequacy ratio under the Basle rules. It measures Tier 1 + Tier 2 capital as a percentage of risk-weighted assets and off balance-sheet risks.



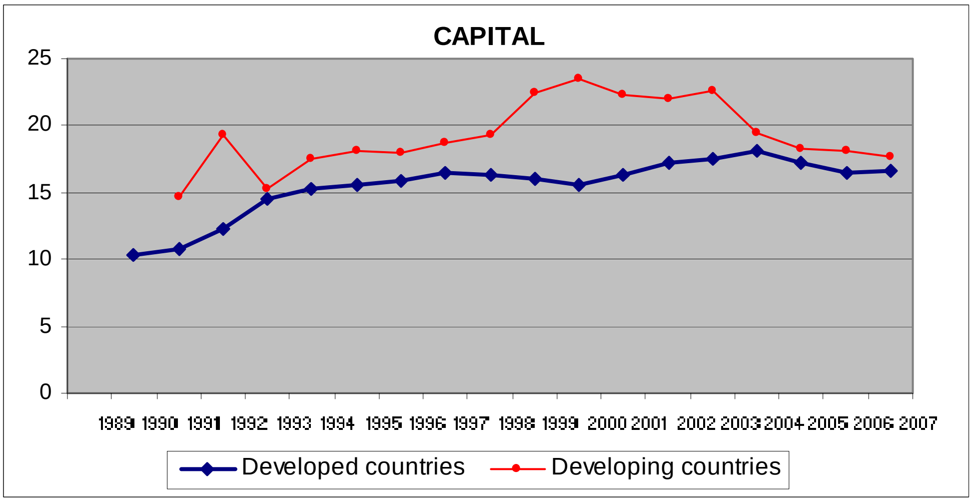


Table 1. Summary statistics by country

Panel A reports descriptive statistics by country. Loan Interest is the ratio of interest income to total earning assets, Deposit Interest is the cost of deposits (the ratio of interest expense to interest-bearing debt of the bank), CAPITAL is the total capital adequacy ratio under the Basel rules published in the bank's annual report, Capital Requirement is the percentage of minimum capital required over risk-weighted assets defined following Basel I and Basel II, ABUFFER is the capital buffer in absolute terms, RBUFFER is the capital buffer in relative terms, SIZE is the logarithm for total bank assets, COLLATERAL is the difference between total assets risks and liquid assets, LATA is the ratio of liquid assets to total assets, TLNTA is the ratio of net total loan to total assets, GDPGR is the growth of per capita GDP, CONC is the country's bank market concentration (the ratio of the three largest banks' assets to total banking sector assets), GNIPC is the gross national income per capita. Bank data are from the BankScope data base of Fitch IBCA and macro data are from the IMF's International Financial Statistics and Beck at al. (2000) and (2009) database. Panel B reports the correlation matrix. *** and ** represent significance at the 1% and 5% levels, respectively.

Panel A: Descriptive statistics *(Mean values)*

COUNTRY	# obsv.	# banks	Loan Interest	Deposit Interest	CAPITAL	Capital Requirement	ABUFFER	RBUFFER	SIZE	COLLATERALTA	LATA	TLNTA	GDPGR	CONC	GNIPC
ALBANIA	13	4	0.2477	0.0351	22.5923	0.12	0.1059	0.8826	12.6135	0.0274	0.6285	0.2802	0.1192	0.8272	1375.5
ALGERIA	10	2	0.1274	0.0209	21.1800	0.08	0.1318	1.6475	14.3647	0.0127	0.3313	0.3101	0.0830	0.8638	2133
ARGENTINA	23	4	0.1333	0.0496	18.4652	0.115	0.0696	0.6056	15.3219	0.0296	0.3400	0.5243	0.0326	0.3737	5874.5
ARMENIA	11	4	0.1936	0.0383	26.5363	0.12	0.1453	1.2113	11.2457	0.0892	0.4336	0.4130	0.2363	0.6387	1019.412
AUSTRALIA	135	20	0.1011	0.0586	11.9237	0.08	0.0392	0.4904	16.4002	0.0144	0.1363	0.7553	-0.0156	0.5975	22417
AUSTRIA	26	12	0.1319	0.0488	12.0500	0.08	0.0405	0.5062	15.2988	0.0161	0.3621	0.5111	-0.0150	0.7167	28430
AZERBAIJAN	67	17	0.1994	0.0610	25.6104	0.1	0.1561	0.1561	11.2968	0.0725	0.2985	0.5668	0.2586	0.7707	1050.625
BAHRAIN	103	13	0.1941	0.0421	24.8506	0.12	0.1285	1.0708	14.5523	0.0099	0.3342	0.4027	0.0615	0.8170	10750
BANGLADESH	150	31	0.1320	0.0644	12.5640	0.08	0.0456	0.5705	12.7813	0.0115	0.2663	0.6435	-0.0151	0.4435	348
BELARUS	51	14	0.3074	0.1173	29.7000	0.1	0.1970	1.9700	12.4068	0.0815	0.3280	0.5334	-0.0119	0.7892	2093.529
BELGIUM	112	15	0.2010	0.0568	12.7625	0.08	0.0476	0.5953	16.9418	0.0057	0.4761	0.3625	0.0274	0.7557	27390.5
BENIN	5	1	0.1153	0.0259	11.7800	0.08	0.0378	0.4725	13.3261	0.0246	0.3548	0.4324	0.0400	0.8750	410.5
BOTSWANA	53	7	0.2607	0.0865	19.3434	0.113	0.0804	0.8665	12.4824	0.0155	0.3489	0.5088	-0.0041	0.8805	3659.5
BRAZIL	691	128	0.7582	0.1945	24.4055	0.11	0.1340	1.2186	14.2999	0.0223	0.4418	0.4017	0.0018	0.4660	3862.5
BULGARIA	81	19	0.2073	0.0624	23.4604	0.12	0.1146	0.9550	13.2824	0.0357	0.4300	0.5016	0.0861	0.5238	2216.5
CANADA	327	54	0.1012	0.0459	16.6335	0.09	0.0756	0.8615	15.0394	0.0067	0.1713	0.6323	0.0523	0.5436	24556
CHILE	112	19	0.1355	0.0658	14.4057	0.08	0.0640	0.8007	15.2061	0.0207	0.2091	0.6584	0.0322	0.5152	4727.5
CHINA	224	69	0.0793	0.0313	13.0940	0.08	0.0509	0.6367	16.0233	0.0133	0.2120	0.5413	0.1313	0.6652	1032.5
COLOMBIA	43	18	0.2713	0.1353	12.2534	0.09	0.0325	0.3614	13.8369	0.0443	0.1894	0.6124	-0.0988	0.3773	2340.5
COSTA RICA	11	3	0.2472	0.0763	19.1390	0.09	0.1023	1.1566	14.3653	0.0329	0.3467	0.4723	-0.0590	0.6629	3654
CROATIA	90	26	0.1239	0.0407	20.8844	0.09	0.1130	1.2209	13.5182	0.0330	0.3850	0.5251	0.0924	0.6026	6561.25
CYPRUS	26	6	0.1774	0.0539	13.6326	0.08	0.0532	0.6238	15.1635	0.0188	0.3493	0.5440	0.0265	0.8752	12874.21
CZECH REPUBLIC	152	21	0.2569	0.0719	22.3605	0.08	0.1436	1.7950	14.7887	0.0218	0.4847	0.4017	0.0848	0.6513	7194.118
DENMARK	778	65	0.1431	0.0360	17.0287	0.08	0.0902	1.1285	13.5814	0.0186	0.1738	0.5716	0.0304	0.7706	35187.5
ECUADOR	65	21	0.2262	0.0682	20.5692	0.09	0.1156	1.2854	12.0455	0.0746	0.2999	0.4896	-0.1107	0.5395	1775.5
EGYPT	71	13	0.1723	0.0632	13.7084	0.087	0.0500	0.5860	14.9692	0.0076	0.4297	0.4558	-0.0042	0.5688	1103.5
FINLAND	47	8	0.1654	0.0834	15.0277	0.08	0.0702	0.8784	15.8167	0.0202	0.2746	0.4713	-0.0125	0.9037	28041.5
FRANCE	748	131	0.2486	0.0782	16.3814	0.08	0.0838	1.0470	15.3538	0.0101	0.3371	0.4799	0.0091	0.4951	26622
GAMBIA	10	2	0.3811	0.0440	13.9900	0.08	0.0599	0.7487	11.5168	0.0460	0.5471	0.3230	0.0240	0.9651	319.5
GEORGIA REP. OF	18	8	0.2252	0.0668	29.3500	0.15	0.1435	0.9566	11.2576	0.0623	0.3285	0.5442	0.0988	0.7403	974.1176
GERMANY	159	25	0.1128	0.0566	11.6710	0.08	0.0367	0.4588	17.8539	0.0085	0.3079	0.4955	0.0100	0.6130	27855.5
GHANA	18	3	0.5151	0.0856	10.6880	0.06	0.0468	0.7814	12.6600	0.0322	0.3979	0.3409	-0.1066	0.8710	401
GREECE	86	18	0.1472	0.0478	14.0767	0.08	0.0607	0.7595	16.0322	0.0182	0.3395	0.5534	0.0586	0.8211	14559
GUYANA	10	2	0.2373	0.0345	22.6700	0.08	0.1467	1.8337	12.1652	0.0436	0.5698	0.2904	-0.0030	1.0000	784.5
HONG KONG	341	41	0.1886	0.0484	27.4049	0.116	0.1579	1.3637	14.9312	0.0194	0.3621	0.4862	0.0164	0.5764	23405.5
HUNGARY	97	18	0.2542	0.0815	14.6864	0.08	0.0668	0.8358	15.0186	0.0267	0.3599	0.5255	0.0135	0.6295	5772
ICELAND	8	5	0.1826	0.1064	10.2000	0.08	0.0220	0.2750	14.8325	0.0151	0.2433	0.6143	-0.1150	1.0000	32029.5

INDIA	547	64	0.2039	0.0688	13.8820	0.08	0.0545	0.6499	14.5609	0.0169	0.4346	0.4708	0.0286	0.3451	511.5
INDONESIA	507	84	0.2932	0.1067	22.6839	0.08	0.1468	1.8354	13.5323	0.0178	0.3894	0.5416	0.0312	0.5175	952.5
IRELAND	10	2	0.0974	0.0545	13.7800	0.08	0.0578	0.7225	17.0595	-0.1489	0.2510	0.6085	0.0650	0.6468	24496
ISRAEL	148	17	0.1039	0.0491	13.7493	0.09	0.0474	0.5277	15.5204	0.0138	0.2609	0.6721	-0.0056	0.7582	15824.5
ITALY	1190	184	0.1604	0.0475	17.1023	0.08	0.0910	1.1377	15.0405	0.0168	0.3443	0.5396	0.0255	0.5054	22865
JAMAICA	17	5	0.5474	0.0693	25.4000	0.1	0.1540	1.5400	14.2948	0.0136	0.6085	0.2588	-0.0541	0.8664	2877
JAPAN	825	152	0.0456	0.0137	11.2368	0.08	0.0323	0.4046	17.4004	0.0164	0.1352	0.6439	-0.0017	0.3709	34159.5
JORDAN	100	11	0.1440	0.0404	19.3380	0.12	0.0733	0.6115	14.6368	0.0156	0.4405	0.4362	0.0252	0.8694	1863
KAZAKHSTAN	84	16	0.1969	0.0869	23.7428	0.12	0.1174	0.9785	13.4924	0.0353	0.3531	0.5585	0.1061	0.6841	2175.294
KENYA	89	21	0.2126	0.0553	21.1471	0.08	0.1333	1.7161	12.3978	0.0254	0.3699	0.5158	-0.0077	0.5803	421.5
KOREA REP. OF	199	25	0.1231	0.0674	11.1971	0.08	0.0319	0.3996	17.0803	0.0233	0.1183	0.5836	0.0519	0.3942	11840.56
KUWAIT	45	5	0.1594	0.0409	20.8778	0.12	0.0887	0.7398	15.9227	0.0103	0.5149	0.4005	0.0535	0.6759	21038.46
KYRGYZSTAN	23	6	0.4933	0.0254	34.0869	0.12	0.2208	1.8405	10.4638	0.0545	0.5291	0.3637	0.0721	0.8638	409.4118
LATVIA	133	27	0.3486	0.0306	23.3897	0.1	0.1338	1.3389	12.4131	0.0362	0.4547	0.3988	0.1036	0.5286	4143.5
LEBANON	407	58	0.3783	0.0689	23.3486	0.0948	0.1386	1.5102	12.7521	0.0330	0.6298	0.2864	0.0306	0.3697	3991.579
LITHUANIA	64	9	0.1125	0.0313	16.7531	0.1	0.0675	0.6753	13.0969	0.0828	0.3068	0.5490	0.1440	0.8008	4527.056
MACEDONIA	32	9	0.1482	0.0313	31.4031	0.08	0.2340	2.9253	12.0756	0.0543	0.4136	0.4936	0.0828	0.7774	2190.588
MALAWI	18	3	0.6129	0.0748	27.5500	0.08	0.1955	2.4437	11.7215	0.0822	0.4313	0.3055	-0.0672	0.8914	190
MALAYSIA	252	37	0.1444	0.0416	20.5496	0.08	0.1254	1.5687	15.0643	0.0073	0.3389	0.5522	0.0332	0.4422	4016.5
MALTA	52	6	0.5691	0.0361	19.9788	0.08	0.1197	1.4973	14.0631	0.0144	0.4528	0.3733	0.0223	0.8067	9865.789
MAURITIUS	16	4	0.1747	0.0787	17.9187	0.1	0.0791	0.7918	12.9593	0.0614	0.3179	0.5764	-0.0450	0.9086	3824.4
MEXICO	118	18	0.3082	0.1665	16.0211	0.08	0.0802	1.0026	15.4811	0.0253	0.2254	0.5950	0.0112	0.6214	5345
MOLDOVA REP. OF	35	10	0.2081	0.0719	34.4894	0.12	0.2248	1.8741	11.1991	0.0605	0.3323	0.5603	0.0600	0.6566	598.8235
NAMIBIA	12	5	0.1282	0.0635	14.2417	0.08	0.0624	0.7802	13.8513	0.0129	0.1066	0.7814	0.0800	0.9055	2366
NEW ZEALAND	37	10	0.0880	0.0569	11.6513	0.08	0.0365	0.4564	16.2639	0.0085	0.0988	0.8020	0.1240	0.8962	27723.5
NIGERIA	69	13	0.3380	0.0469	20.8021	0.08	0.1280	1.6002	14.2809	0.0383	0.5803	0.2857	0.0469	0.4204	412.5
NORWAY	150	17	0.0875	0.0659	12.1120	0.08	0.0411	0.5140	15.1091	0.0112	0.0746	0.8140	0.0487	0.9012	42045.5
OMAN	61	9	0.0970	0.0375	19.1245	0.12	0.0712	0.5937	14.0991	0.0102	0.2462	0.6697	0.0652	0.7607	6779.444
PAKISTAN	48	17	0.1342	0.0444	16.5458	0.08	0.8540	1.0682	14.4266	0.0287	0.3265	0.5160	0.0445	0.4406	549.5
PERU	19	24	0.1695	0.0512	11.3789	0.09	0.0232	0.2573	15.2025	0.0338	0.2498	0.5605	0.0284	0.6866	2073.5
PHILIPPINES	164	30	0.1768	0.0496	19.4923	0.1	0.0949	0.9492	14.2015	0.0280	0.2764	0.4666	0.0017	0.7001	1069.5
POLAND	222	41	0.2664	0.0812	16.9675	0.08	0.0896	1.1209	14.2661	0.0235	0.4252	0.4884	0.0414	0.5777	5238.235
PORTUGAL	42	13	0.2567	0.0744	16.9738	0.08	0.0897	1.1217	15.7934	0.0241	0.4491	0.3763	0.0419	0.5343	12058
QATAR	24	5	0.0783	0.0204	23.8750	0.096	0.1420	1.4977	14.8914	0.0108	0.3307	0.5536	0.1416	0.9038	
ROMANIA	51	15	0.7339	0.1516	38.9886	0.08	0.3098	3.8735	13.3108	0.1108	0.4792	0.3725	-0.1658	0.6860	
RUSSIAN FED.	245	115	0.2814	0.0732	30.8661	0.116	0.1918	1.6383	12.7306	0.0537	0.4001	0.4574	0.0360	0.3113	3474.444
RWANDA	7	2	0.2680	0.0206	17.3571	0.075	0.0978	1.2992	11.5668	0.0308	0.5366	0.3893	0.0285	0.7819	274.5
SENEGAL	6	2	0.0857	0.0130	24.4500	0.08	0.1645	2.0562	12.1589	0.0527	0.2138	0.5881	0.0983	0.6695	880
SINGAPORE	54	10	0.0806	0.0310	24.1388	0.12	0.1213	1.0115	16.3780	0.0166	0.2901	0.5842	0.0144	0.8298	208545
SLOVAKIA	83	15	0.1987	0.0499	17.3698	0.08	0.0936	1.1712	14.4710	0.0295	0.4409	0.4239	0.0995	0.7715	5146
SLOVENIA	106	16	0.1262	0.0486	15.1679	0.08	0.0716	0.8959	14.2656	0.0226	0.2725	0.5606	0.0092	0.6368	12654.12
SOUTH AFRICA	161	29	0.2082	0.1135	18.4875	0.086	0.0982	1.1602	13.3541	0.0152	0.2245	0.6991	-0.0163	0.8593	3716
SPAIN	252	32	0.2156	0.0483	12.8924	0.08	0.0489	0.6115	16.5977	0.0226	0.3490	0.5494	0.0244	0.7259	17570.5
SRI LANKA	64	11	0.1556	0.0847	15.1084	0.09	0.0585	0.6697	13.2549	0.0309	0.2734	0.6061	-0.0168	0.6652	873.5
SWEDEN	159	19	0.1393	0.0366	15.5849	0.08	0.0758	0.9481	14.9705	0.0081	0.1927	0.6989	0.0420	0.9466	43513.5
THAILAND	130	19	0.0885	0.0343	15.5783	0.085	0.0707	0.8327	15.8362	0.0508	0.2172	0.6451	0.0574	0.4798	2182.5
TRINIDAD & TOBAGO	14	3	0.1479	0.0470	14.7714	0.08	0.0677	0.8464	13.8422	0.0271	0.2230	0.6289	0.0714	0.8002	6642.5
TURKEY	130	32	0.4354	0.1199	23.6825	0.08	0.1568	1.9603	15.4598	0.0285	0.4791	0.4297	0.0184	0.6897	3972.5
UKRAINE	226	43	0.2269	0.0845	20.3157	0.08	0.1231	1.5394	12.8425	0.0717	0.2692	0.6070	0.0792	0.4704	1303
UNITED KINGDOM	375	52	0.2008	0.0593	19.2018	0.08	0.1120	1.4002	15.9276	0.0100	0.3495	0.4878	0.0447	0.6371	25898.5
USA	6487	608	0.1247	0.0337	14.8666	0.08	0.0686	0.8583	14.6004	0.0147	0.1025	0.6172	0.0153	0.2377	32811
VENEZUELA	197	44	0.5896	0.0924	27.7101	0.106	0.1707	1.6358	12.3878	0.0406	0.2597	0.4107	-0.1403	0.4290	

VIETNAM	20	10	0.1226	0.0484	13.5840	0.08	0.0558	0.6980	14.1173	0.0213	0.3306	0.5419	0.0460	0.7022	387
ZAMBIA	5	1	0.3409	0.1322	21.8000	0.08	0.1380	1.7250	10.7014	0.0120	0.4069	0.4848	0.0860	0.5825	419.5
ZIMBABWE	42	9	1.2316	0.2292	21.5333	0.087	0.1277	1.4360	8.1795	0.0434	0.3987	0.3816	-0.5914	0.7348	640
MEDIAN			0.1169	0.0393	13.16	0.08	0.048	0.5693	14.5432	0.0138	0.1957	0.5839	0.02	0.4227	1629999.81
MEAN			0.1946	0.0558	17.207	0.0853	0.0867	1.0078	14.6566	0.0192	0.2511	0.5541	0.0216	0.4625	22417
STANDARD DEVIATION			0.3440	0.0623	12.2104	0.0122	0.1196	1.3771	2.1635	0.0312	0.2086	0.2006	0.1020	0.2191	2713072.98

Panel B: Correlations

VARIABLES	LOANRATE	COSTDEP	CAPITAL	ABUFFER	RBUFFER	SIZE	COLLATERALTA	LATA	TLNTA	GDPGR	CONC
LOANRATE	1.000										
COSTDEP	0.3749***	1.000									
CAPITAL	0.2599***	0.1307***	1.000								
ABUFFER	0.2479***	0.1128***	0.9952***	1.000							
RBUFFER	0.2305***	0.0903***	0.9699***	0.9848***	1.000						
SIZE	-0.1611***	-0.1054***	-0.3777***	-0.3667***	-0.3516***	1.000					
COLLATERALTA	0.0864***	0.1371***	0.1256***	0.1102***	0.0891***	-0.2400***	1.000				
LATA	0.3987***	0.1585***	0.3616***	0.3426***	0.3250***	-0.1522***	0.0524***	1.000			
TLNTA	-0.4688***	-0.0925***	-0.3984***	-0.3886***	-0.3803***	0.1087***	0.0965***	-0.7700***	1.000		
GDPG	-0.1987	-0.2359***	-0.0100	-0.0130**	-0.0101	0.0833***	-0.0969***	-0.0166**	0.0698***	1.000	
CONC	0.450***	0.1183***	0.0776***	0.0624***	0.0516***	-0.0094	0.0805***	0.2512***	-0.0908***	0.0225***	1.000

Table 2
Interest rate spreads and capital buffers

Regressions are estimated using the Arellano and Bond (1991) GMM difference estimator for panel data with lagged dependent variables. The dependent variable is the lending rate spread (LOANRATE) in Panel A and the deposit rate spread (COSTDEP) in Panel B. As explanatory variables we include one lag of the dependent variable ($LOANRATE_{i,t-1}$ or $COSTDEP_{i,t-1}$), the capital buffer in relative terms (RBUFFER) or total capital over risk-weighted assets (CAPITAL), the natural logarithm of bank assets (SIZE), the ratio of collateral to total bank assets (COLLATERALTA), the ratio of liquid assets to total bank assets (LATA), the ratio of total loans to total bank assets (TLNTA), the country's bank market concentration (CONC), and the growth of per capita GDP in the country (GDPGR). Regressions are estimated for 1990-2007. Year and country dummy variables are included for all the estimations but are not reported. T-statistics are in parentheses. ***, **, and * represent significance at the 1%, 5% and 10% levels, respectively.

	Panel A. Dependent variable: Lending Rate Spread				Panel B. Dependent variable: Deposit Rate Spread			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$LOANRATE_{t-1}/COSTDEP_{t-1}$	0.2482***	0.24852***	0.2477***	0.2480***	0.1713**	0.1717**	0.1705**	0.1709**
	(2.85)	(2.86)	(2.85)	(2.86)	(2.03)	(2.04)	(2.03)	(2.04)
RBUFFER	-0.3696**	-0.3567**			-0.0051**	-0.0048**		
	(-2.15)	(-2.01)			(-2.55)	(-2.47)		
CAPITAL			-0.0490**	-0.0481**			-0.006***	-0.0006***
			(-2.02)	(-1.92)			(-2.68)	(-2.63)
SIZE	-1.2340	-1.1533	-1.2715	-1.2046	-0.0272***	-0.0219**	-0.0274***	-0.0222**
	(-1.27)	(-1.28)	(-1.29)	(-1.30)	(-2.93)	(-2.50)	(-2.92)	(-2.50)
COLLATERALTA	-4.8984	-3.8434	-4.4396	-3.661	0.1451	0.1548	0.1546	0.1621
	(-0.58)	(-0.45)	(-0.53)	(-0.44)	(0.75)	(0.84)	(0.81)	(0.89)
LATA	2.1108*	2.1736	2.3438**	2.2159	0.0092	0.0065	0.0125	0.0073
	(1.75)	(1.25)	(1.99)	(1.28)	(0.52)	(0.32)	(0.71)	(0.36)
TLNTA		-0.0423		-0.3069		-0.0039		-0.0067
		(-0.02)		(-0.17)		(-0.13)		(-0.23)
CONC	1.4411***	1.5752	1.5518	1.5326	-0.0189	-0.0181	-0.0199	-0.0193
	(5.25)	(1.05)	(1.07)	(1.02)	(-1.21)	(1.15)	(-1.27)	(-1.22)
GDPGR	1.0227	1.1744	1.1125	1.2707	-0.0307**	-0.0287**	-0.0292**	-0.0273**
	(0.79)	(0.92)	(0.87)	(1.00)	(-2.46)	(-2.34)	(-2.37)	(-2.25)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
m_1	-1.57	-1.57	-1.59	-1.59	-3.43***	-3.47***	-3.47***	-3.50***
m_2	-0.46	-0.47	-0.47	-0.43	0.64	0.59	0.68	0.63
# observations	13,651	13,651	13,651	13,651	13,612	13,606	13,612	13,606
# banks	2,316	2,316	2,316	2,316	2,317	2,314	2317	2314
# countries	92	92	92	92	92	92	92	92

Table 3
Lending rate spreads and country development

Regressions are estimated using the Arellano and Bond (1991) GMM difference estimator for panel data with lagged dependent variables. The dependent variable is the lending rate spread. As explanatory variables we include one lag of the dependent variable ($LOANRATE_{i,t-1}$), the capital buffer in relative terms (RBUFFER) or total capital over risk-weighted assets (CAPITAL), the natural logarithm of bank assets (SIZE), the ratio of collateral to total bank assets (COLLATERALTA), the ratio of liquid assets to total bank assets (LATA), the ratio of total loans to total bank assets (TLNTA), the country's bank market concentration (CONC), and the growth of per capita GDP in the country (GDPGR). DEVELOP is a dummy variable that takes a value of 1 for countries classified as high income and upper middle income and zero otherwise. OECD takes a value of 1 for OECD countries and zero otherwise. G20 takes a value of 1 for countries belonging to the G20 group and zero otherwise. G8 takes a value of 1 for countries belonging to the G8 group and zero otherwise. Regressions are estimated for 1990-2007. Year and country dummy variables are included for all the estimations but are not reported. T-statistics are in parentheses. ***, **, and * represent significance at the 1%, 5% and 10% levels, respectively.

	RBUFFER					CAPITAL				
	(1)	(2)	(3)	(4)	(5)	(6)	(5)	(6)	(7)	(8)
$LOANRATE_{t-1}$	0.246***	0.2473***	0.2483***	0.2478***	0.2455***	0.2459**	0.2457***	0.2475***	0.2466***	0.2456***
	(2.85)	(2.86)	(2.85)	(2.85)	(2.87)	(2.86)	(2.86)	(2.85)	(2.86)	(2.88)
RBUFFER /CAPITAL	-0.6412**	-0.7075**	-0.3490	-0.4139*	-2.9082***	-0.0697*	-0.0908**	-0.0472	-0.0547*	-0.2741**
	(-2.01)	(-2.27)	(-1.49)	(-1.79)	(-2.75)	(-1.84)	(-2.23)	(-1.40)	(-1.75)	(-2.50)
RBUFFER /CAPITAL x DEVELOP	0.5939**					0.0532**				
	(2.21)					(1.91)				
RBUFFER /CAPITAL x OECD		0.7161**					0.0947**			
		(2.45)					(2.50)			
RBUFFER /CAPITAL x G20			0.0410					0.0027		
			(0.21)					(0.10)		
RBUFFER /CAPITAL x G8				0.3192					0.0513*	
				(1.48)					(1.73)	
RBUFFER /CAPITAL x KKZ					0.1688***					0.0151**
					(2.73)					(2.52)
SIZE	-1.1802	-1.0493	-1.0745	-1.0744	-1.1673	-1.3296	-1.1111	-1.2083	-10884	-1.2223
	(-1.28)	(-1.13)	(-1.21)	(-1.19)	(-1.28)	(-1.42)	(-1.20)	(-1.32)	(-1.18)	(-1.30)
COLLATERALTA	-5.7503	-3.7039	-4.2398	-5.1959	-4.2330	-6.6448	-3.6491	-4.1390	-4.6732	-3.7651
	(-0.72)	(-0.47)	(-0.52)	(-0.62)	(-0.51)	(-0.82)	(-0.46)	(-0.51)	(-0.56)	(-0.46)
LATA	1.6385	1.6843	1.8556*	1.6313	2.2460**	1.8690	2.0826*	2.0260*	1.7789*	2.2689**
	(1.43)	(1.52)	(1.69)	(1.52)	(2.12)	(1.62)	(1.90)	(1.81)	(1.66)	(2.20)
CONC	1.2992	1.7920	1.4745	1.5842	1.4585	1.4634	1.8936	1.3893	1.7067	1.4876
	(0.90)	(1.24)	(1.04)	(1.11)	(0.99)	(1.04)	(1.34)	(0.98)	(1.21)	(1.00)
GDPGR	1.1911	1.3384	1.2259	1.0886	0.9707	1.5721	1.8808	1.1089	1.4352	0.9975
	(0.96)	(1.08)	(0.94)	(0.86)	(0.78)	(1.30)	(1.59)	(0.86)	(1.20)	(0.80)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
m_1	-1.62	-1.60	-1.55	-1.56	-1.63	-1.66*	-1.66*	-1.59	-1.58	-1.66*
m_2	-0.51	-0.52	-0.48	0.51	-0.52	-0.42	-0.47	-0.47	-0.49	-0.41
# observations	13,651	13,651	13,651	13,651	13,651	13,651	13,651	13,651	13,651	13,651
# banks	2,316	2,316	2,316	2,316	2,316	2,316	2,316	2,316	2,316	2,316
# countries	92	92	92	92	92	92	92	92	92	92

Table 4
Deposit rate spreads and country development

Regressions are estimated using the Arellano and Bond (1991) GMM difference estimator for panel data with lagged dependent variables. The dependent variable is the deposit rate spread (COSTDEP). As explanatory variables we include one lag of the dependent variable ($COSTDEP_{i,t--1}$), the capital buffer in relative terms (RBUFFER) or total capital over risk-weighted assets (CAPITAL), the natural logarithm of bank assets (SIZE), the ratio of collateral to total bank assets (COLLATERALTA), the ratio of liquid assets to total bank assets (LATA), the ratio of total loans to total bank assets (TLNTA), the country's bank market concentration (CONC), and the growth of per capita GDP in the country (GDPGR). DEVELOP is a dummy variable that takes a value of 1 for countries classified as high income and upper middle income and zero otherwise. OECD takes a value of 1 for OECD countries and zero otherwise. G20 takes a value of 1 for countries belonging to the G20 group and zero otherwise. G8 takes a value of 1 for countries belonging to the G8 group and zero otherwise. INS is a dummy variable that takes a value of 1 if the country has a deposit insurance scheme and zero otherwise. Regressions are estimated for 1990-2007. Year and country dummy variables are included for all the estimations but are not reported. T-statistics are in parentheses. ***, **, and * represent significance at the 1%, 5% and 10% levels, respectively.

	RBUFFER						CAPITAL					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$COSTDEP_{t-1}$	0.1705**	0.1701**	0.1718**	0.1707**	0.1675**	0.1679**	0.1695**	0.1691**	0.1714**	0.1694**	0.1667**	0.1670**
	(2.04)	(2.04)	(2.04)	(2.03)	(2.03)	(2.03)	(2.03)	(2.04)	(2.04)	(2.03)	(2.03)	(2.03)
RBUFFER /CAPITAL	-0.0051**	-0.0087**	-0.0034	-0.0051**	-0.0396***	0.0020	-0.0005*	-0.0011***	-0.0004	-0.0007**	-0.0042***	0.0013
	(-1.98)	(-2.56)	(-1.40)	(-2.16)	(-3.79)	(0.24)	(-1.84)	(-2.68)	(-1.45)	(-2.29)	(-3.80)	(1.25)
RBUFFER /CAPITAL x DEVELOP	0.0028						0.0001					
	(1.18)						(0.45)					
RBUFFER /CAPITAL x OECD		0.0073**						0.0009**				
		(2.08)						(2.29)				
RBUFFER /CAPITAL x G20			-0.0009						-0.0002			
			(-0.35)						(-0.73)			
RBUFFER /CAPITAL x G8				0.0034						0.0005		
				(1.08)						(1.38)		
RBUFFER /CAPITAL x KKZ					0.0022***						0.0002***	
					(3.59)						(3.58)	
RBUFFER /CAPITAL x INS						-0.0069						-0.0021
						(-0.66)						(-1.62)
SIZE	-0.0254***	-0.0223**	-0.0227***	-0.0228***	-0.0240***	-0.0261***	-0.0262***	-0.0214**	-0.0242***	-0.0225***	-0.0243***	-0.0256***
	(-2.91)	(-2.52)	(-2.77)	(-2.78)	(-2.80)	(-2.89)	(-2.96)	(-2.43)	(-2.92)	(-2.79)	(-2.82)	(-2.80)
COLLATERALTA	0.1512	0.1783	0.1348	0.1453	0.1529	001718	0.1543	0.1883	0.1374	0.1657	0.1624	0.1793
	(0.81)	(0.99)	(0.72)	(0.78)	(0.82)	(0.94)	(0.83)	(1.04)	(0.74)	(0.90)	(0.88)	(1.00)
LATA	0.0019	-0.0032	-0.0007	-0.0019	0.0079	-0.0008	0.0051	0.0030	0.0026	0.0024	0.0090	0.0041
	(0.11)	(-0.18)	(-0.04)	(-0.11)	(0.48)	(-0.05)	(0.30)	(0.18)	(0.15)	(0.14)	(0.57)	(0.23)
CONC	-0.0221	-0.0172	-0.0220	-0.0205	-0.0163	-0.0235	-0.0219	-0.0176	-0.0255	-0.0209	-0.0209	-0.0239
	(-1.46)	(-1.11)	(-1.45)	(-1.38)	(-1.06)	(-1.52)	(-1.46)	(-1.13)	(-1.63)	(-1.38)	(-1.35)	(-1.53)
GDPGR	-0.0305**	-0.0253**	-0.0268**	-0.0290**	-0.0314***	-0.0307**	-0.0282**	-0.0208*	-0.0251**	-0.0257**	-0.0302***	-0.0295**
	(-2.55)	(-2.13)	(-2.14)	(-2.37)	(-2.63)	(-2.52)	(-2.46)	(-1.80)	(-2.01)	(-2.21)	(-2.60)	(-2.46)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
m_1	-3.44***	-3.53***	-3.44***	-3.46***	-3.55***	-3.45***	-3.47***	-3.59***	-3.47***	-3.51***	-3.61***	-3.49***
m_2	0.63	0.64	0.60	0.62	0.62	0.60	0.66	0.71	0.65	0.66	0.69	0.63
# observations	13,612	13,612	13,612	13,612	13,612	13,612	1,3612	1,3612	1,3612	1,3612	13,612	13,612
# banks	2,317	2,317	2,317	2,317	2,317	2,317	2,317	2,317	2,317	2,317	2,317	2,317
# countries	92	92	92	92	92	92	92	92	92	92	92	92

Table 5
Interest rate spreads, capital buffers, and cyclical effects

Regressions are estimated using the Arellano and Bond (1991) GMM difference estimator for panel data with lagged dependent variables. The dependent variable is the lending rate spread (LOANRATE) in Panel A and the deposit rate spread (COSTDEP) in Panel B. As explanatory variables we include one lag of the dependent variable ($LOANRATE_{i,t-1}$ or $COSTDEP_{i,t-1}$), the capital buffer in relative terms (RBUFFER) or total capital over risk-weighted assets (CAPITAL), the natural logarithm of bank assets (SIZE), the ratio of collateral to total bank assets (COLLATERALTA), the ratio of liquid assets to total bank assets (LATA), the ratio of total loans to total bank assets (TLNTA), the country's bank market concentration (CONC), and the growth of per capita GDP in the country (GDPGR). Regressions are estimated for 1990-2007. Year and country dummy variables are included for all the estimations but are not reported. T-statistics are in parentheses. ***, **, and * represent significance at the 1%, 5% and 10% levels, respectively.

	Panel A. Dependent variable: Lending Rate Spread				Panel B. Dependent variable: Deposit Rate Spread			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$LOANRATE_{t-1}/COSTDEP_{t-1}$	0.2327***	0.2327***	0.2343***	0.2343***	0.1541**	0.1544**	0.1575**	0.1578**
	(2.94)	(2.95)	(2.93)	(2.93)	(2.03)	(2.04)	(2.02)	(2.03)
RBUFFER	-0.4540**	-0.4379**			-0.0059***	-0.0052**		
	(-2.52)	(-2.36)			(-2.75)	(-2.57)		
CAPITAL			-0.0538**	-0.0520**			-0.0007***	-0.0006***
			(-2.19)	(-2.06)			(-2.73)	(-2.60)
SIZE	-1.3336	-1.2320	-1.4617	-1.3547	-0.0299***	-0.0254***	-0.0302***	-0.0258***
	(-1.50)	(-1.47)	(-1.60)	(-1.57)	(-3.38)	(3.02)	(-3.39)	(-3.01)
COLLATERALTA	-1.3689	-0.5777	-1.4790	-0.9083	0.1977	0.2001	0.1986	0.1977
	(-0.16)	(-0.06)	(-0.17)	(-0.10)	(1.10)	(1.14)	(1.11)	(1.14)
LATA	2.4362**	2.3383	2.5187**	2.2796	0.0120	0.0074	0.0133	0.0043
	(2.13)	(1.41)	(2.27)	(1.37)	(0.70)	(0.37)	(0.77)	(0.21)
TLNTA		-0.0957		-0.2314		-0.0047		-0.0102
		(-0.05)		(-0.13)		(-0.17)		(-0.37)
CONC	1.4734	1.5555	1.6061	1.6641	-0.0187	-0.0181	-0.0187	-0.0182
	(1.04)	(1.06)	(1.15)	(1.15)	(-1.27)	(-1.20)	(-1.29)	(-1.24)
GDPGR	-2.5871	-2.4893	-6.0191*	-5.9606*	-0.0606***	-0.0592***	-0.0735**	-0.0727**
	(-1.41)	(-1.34)	(-1.77)	(-1.74)	(-3.48)	(-3.40)	(-2.51)	(-2.45)
RBUFFER x GDPGR	4.2956***	4.3182***			0.0367***	0.0373***		
	(3.45)	(3.45)			(2.94)	(2.94)		
CAPITAL x GDPGR			0.4422***	0.4465***			0.0028*	0.0029*
			(0.60)	(2.61)			(1.93)	(1.93)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
m_1	-1.70*	-1.70*	-1.81*	-1.81*	-3.59***	-3.63***	-3.59***	-3.62***
m_2	-1.07	-1.11	-0.77	-0.80	0.56	0.51	0.65	0.60
# observations	13,651	13,651	13,651	13,651	13,606	13,606	13,612	13,612
# banks	2,316	2,316	2,316	2,316	2,314	2,314	2,317	2,317
# countries	92	92	92	92	92	92	92	92

Table 6
Cyclical effects of capital buffers, lending rates, and country development

Regressions are estimated using the Arellano and Bond (1991) GMM difference estimator for panel data with lagged dependent variables. The dependent variable is the lending rate spread. As explanatory variables we include one lag of the dependent variable ($LOANRATE_{i,t-1}$), the capital buffer in relative terms (RBUFFER) or total capital over risk-weighted assets (CAPITAL), the natural logarithm of bank assets (SIZE), the ratio of collateral to total bank assets (COLLATERALTA), the ratio of liquid assets to total bank assets (LATA), the ratio of total loans to total bank assets (TLNTA), the country's bank market concentration (CONC), and the growth of per capita GDP in the country (GDPGR). DEVELOP is a dummy variable that takes a value of 1 for countries classified as high income and upper middle income and zero otherwise. OECD takes a value of 1 for OECD countries and zero otherwise. G20 takes a value of 1 for countries belonging to the G20 group and zero otherwise. G8 takes a value of 1 for countries belonging to the G8 group and zero otherwise. Regressions are estimated for 1990-2007. Year and country dummy variables are included for all the estimations but are not reported. T-statistics are in parentheses. ***, **, and * represent significance at the 1%, 5% and 10% levels, respectively.

	RBUFFER					CAPITAL				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$LOANRATE_{t-1}$	0.2261***	0.2255***	0.2212***	0.2289***	0.2106***	0.2285***	0.2285***	0.2229***	0.2307***	0.2228***
	(3.05)	(3.02)	(2.99)	(2.99)	(3.12)	(3.07)	(3.00)	(2.97)	(2.99)	(3.11)
BUFFER /CAPITAL	-0.3838**	-0.4657***	-0.4558***	-0.3641**	-0.2961**	-0.0439*	-0.0493**	-0.0476**	-0.0425*	-0.0437*
	(-2.29)	(-2.63)	(-2.74)	(-2.21)	(-2.05)	(-1.91)	(-2.13)	(-2.11)	(-1.90)	(-1.86)
SIZE	-1.1971	-1.4056*	-1.3345*	-1.2414	-1.1232	-1.2774	-1.5516*	-1.6665*	-1.4474*	-1.4981
	(-1.46)	(-1.64)	(-1.64)	(-1.57)	(-1.40)	(-1.51)	(-1.71)	(-1.88)	(-1.70)	(-1.61)
COLLATERALTA	-0.0117	-1.5226	-0.8890	-1.2272	-0.2838	1.5086	-0.8122	2.9794	2.0548	3.0352
	(-0.00)	(-0.18)	(-0.11)	(-0.14)	(-0.03)	(0.19)	(-0.09)	(0.37)	(0.23)	(0.38)
LATA	1.5451	2.0193*	2.1537**	-2.4409**	2.8536***	1.544	2.3524**	2.4240**	2.9932***	2.8171**
	(1.39)	(1.91)	(1.90)	(2.34)	(2.71)	(1.43)	(2.22)	(2.22)	(2.96)	(2.59)
CONC	1.6224	2.1012	-2.5171*	1.9249	2.0300	1.7742	2.4465*	2.9903**	2.0677*	1.6709
	(1.12)	(1.56)	(1.85)	(1.52)	(1.39)	(1.25)	(1.83)	(2.21)	(1.71)	(1.10)
GDPGR	-1.3558	-2.0677	-2.6863	-2.2867	-1.9975	-5.2478*	-5.1937	-6.2332*	-4.1165	-4.7694
	(-0.82)	(1.14)	(-1.47)	(-1.28)	(-1.31)	(-1.67)	(-1.48)	(-1.88)	(-1.22)	(-1.39)
BUFFER /CAPITAL x GDPGR	7.6011***	5.5978***	6.0240***	5.2378***	27.559***	0.8488***	0.4814***	0.5204**	0.4463***	1.784***
	(4.42)	(3.55)	(2.81)	(3.91)	(3.99)	(4.30)	(2.76)	(2.43)	(2.70)	(3.33)
BUFFER /CAPITAL x GDPGR x DEVELOP	-5.6892***					-0.5407***				
	(-4.33)					(-4.68)				
BUFFER /CAPITAL x GDPGR x OECD		-3.1814*					-0.1434			
		(-1.79)					(-1.01)			
BUFFER /CAPITAL x GDPGR x G20			-1.9092					-0.0339		
			(-0.91)					(-0.23)		
BUFFER /CAPITAL x GDPGR x G8				-6.8222***					-0.5400***	
				(-6.30)					(-5.43)	
BUFFER /CAPITAL x GDPGR x KKZ					-1.6730***					-0.0980***
					(-3.80)					(-3.19)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
m_1	-1.94*	-1.73*	-1.78*	-1.78*	-2.25**	-2.15**	-1.81*	-1.90*	-1.88*	-2.35**
m_2	-1.47	-1.09	-1.52	-1.06	-1.75*	-1.26	-0.72	-1.10	-0.59	-1.44
# observations	13,651	13,651	13,651	13,651	13,651	13,651	13,651	13,651	13,651	13,651
# banks	2,316	2,316	2,316	2,316	2,316	2,316	2,316	2,316	2,316	2,316
# countries	92	92	92	92	92	92	92	92	92	92

Table 7
Cyclical effects of capital buffers, cost of deposits, and country development

Regressions are estimated using the Arellano and Bond (1991) GMM difference estimator for panel data with lagged dependent variables. The dependent variable is the deposit rate spread (COSTDEP). As explanatory variables we include one lag of the dependent variable ($COSTDEP_{i,t-1}$), the capital buffer in relative terms (RBUFFER) or total capital over risk-weighted assets (CAPITAL), the natural logarithm of bank assets (SIZE), the ratio of collateral to total bank assets (COLLATERALTA, the ratio of liquid assets to total bank assets (LATA), the ratio of total loans to total bank assets (TLNTA), the country's bank market concentration (CONC), and the growth of per capita GDP in the country (GDPGR). DEVELOP is a dummy variable that takes a value of 1 for countries classified as high income and upper middle income and zero otherwise. OECD takes a value of 1 for OECD countries and zero otherwise. G20 takes a value of 1 for countries belonging to the G20 group and zero otherwise. G8 takes a value of 1 for countries belonging to the G8 group and zero otherwise. Regressions are estimated for 1990-2007. Year and country dummy variables are included for all the estimations but are not reported. T-statistics are in parentheses. ***, **, and * represent significance at the 1%, 5% and 10% levels, respectively.

	RBUFFER					CAPITAL				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$COSTDEP_{t-1}$	0.1436**	0.1499**	0.1497**	0.1507**	0.1329**	0.1473**	0.1561**	0.1532**	0.1473**	0.1465**
	(2.06)	(2.03)	(2.03)	(2.03)	(2.02)	(2.07)	(2.02)	(2.01)	(2.07)	(2.06)
BUFFER /CAPITAL	-0.0051**	-0.0060***	-0.0055***	-0.0053***	-0.0033*	-0.0006**	-0.007***	-0.0006***	-0.0006**	-0.0005**
	(-2.42)	(-2.86)	(-2.72)	(-2.70)	(-1.79)	(-2.32)	(-2.80)	(-2.62)	(-2.32)	(-2.26)
SIZE	-0.0253***	-0.0291***	-0.0247***	-0.0230***	-0.0248***	-0.0250***	-0.0291***	-0.0266***	-0.0250***	-0.0273***
	(-3.22)	(-3.57)	(2.98)	(-2.88)	(-3.33)	(-3.14)	(-3.46)	(-3.11)	(-3.14)	(-3.17)
COLLATERALTA	0.2121	0.2111	0.1908	0.1979	0.2276	0.2191	0.2163	0.2164	0.2191	0.2481
	(1.27)	(1.22)	(1.09)	(1.12)	(1.31)	(1.34)	(1.26)	(1.27)	(1.34)	(1.45)
LATA	-0.0066	0.0101	0.0121	0.0219	0.0140	-0.0057	0.0108	0.0159	-0.0057	0.0176
	(-0.38)	(0.61)	(0.75)	(1.36)	(0.86)	(-0.33)	(0.65)	(0.95)	(-0.33)	(1.04)
CONC	-0.0119	-0.0125	-0.0053	-0.0144	-0.0051	-0.0127	-0.0114	-0.0029	-0.0127	-0.0097
	(-0.85)	(-0.92)	(-0.39)	(-1.06)	(-0.38)	(-0.94)	(-0.87)	(-0.22)	(-0.94)	(-0.71)
GDPGR	-0.0492***	-0.0563***	-0.0601***	-0.0613***	-0.0580***	-0.0565**	-0.0828***	-0.0702**	-0.0565**	-0.0620**
	(-3.04)	(-3.26)	(-3.42)	(-3.57)	(-3.79)	(-2.00)	(-2.73)	(-2.42)	(-2.00)	(-2.12)
BUFFER /CAPITAL x	0.0690***	0.0418***	0.0460**	0.0437***	0.2713***	0.0064***	0.0028*	0.0031*	0.0064***	0.0150***
GDPGR	(3.89)	(2.75)	(2.33)	(3.32)	(4.32)	(3.47)	(1.88)	(1.81)	(3.47)	(3.21)
BUFFER /CAPITAL x	-0.0677***					-0.0063***				
GDPGR x DEVELOP	(-4.11)					(-5.16)				
BUFFER /CAPITAL x		-0.0084					0.0023			
GDPGR x OECD		(-0.46)					(1.51)			
BUFFER /CAPITAL x			-0.0114					-0.0003		
GDPGR x G20			(-0.63)					(-0.26)		
BUFFER /CAPITAL x				-0.0501***					-0.063***	
GDPGR x G8				(-3.80)					(-5.16)	
BUFFER /CAPITAL x					-0.0171***					-0.0009***
GDPGR x KKZ					(-4.16)					(-3.22)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
m_1	-3.82***	-3.65***	-3.70***	-3.71	-4.11***	-3.89***	-3.61***	-3.66***	-3.89***	-3.98***
m_2	0.19	0.50	0.43	0.46	0.14	0.24	0.58	0.55	0.24	0.43
# observations	13,612	13,612	13,612	13,612	13,612	13,612	13,612	13,612	13,612	13,612
# banks	2,317	2,317	2,317	2,317	2,317	2,317	2,317	2,317	2,317	2,317
# countries	92	92	92	92	92	92	92	92	92	92

Table 8
Interest rate spreads, capital buffers, and regulatory regime

Regressions are estimated using the Arellano and Bond (1991) GMM difference estimator for panel data with lagged dependent variables. The dependent variable is the lending rate spread (LOANRATE) in Panel A and the deposit rate spread (COSTDEP) in Panel B. As explanatory variables we include one lag of the dependent variable ($LOANRATE_{i,t-1}$ or $COSTDEP_{i,t-1}$), the capital buffer in relative terms (RBUFFER) or total capital over risk-weighted assets (CAPITAL), the natural logarithm of bank assets (SIZE), the ratio of collateral to total bank assets (COLLATERALTA), the ratio of liquid assets to total bank assets (LATA), the ratio of total loans to total bank assets (TLNTA), the country's bank market concentration (CONC), and the growth of per capita GDP in the country (GDPGR). Basel II is a dummy variable that takes the value of 1 for the 2004-2007 period and zero otherwise. Regressions are estimated for 1990-2007. Year and country dummy variables are included for all the estimations but are not reported. T-statistics are in parentheses. ***, **, and * represent significance at the 1%, 5% and 10% levels, respectively.

	Panel A. Dependent variable: Lending Rate Spread		Panel B. Dependent variable: Deposit Rate Spread	
	(1)	(2)	(3)	(4)
$LOANRATE_{t-1}$	0.2485***	0.2479***	0.1714**	0.1707**
	(2.85)	(2.85)	(2.03)	(2.03)
RBUFFER	-0.3947**		-0.0048**	
	(-2.18)		(-2.33)	
RBUFFER x BASELII	-0.1601		0.0022	
	(-1.39)		(1.54)	
CAPITAL		-0.0520**		-0.0006**
		(-2.04)		(-2.50)
CAPITAL x BASELII		-0.0226		0.0002
		(-1.46)		(1.08)
SIZE	-1.2757	-1.3223	-0.0268***	-0.0271***
	(-1.29)	(-1.31)	(-2.84)	(-2.83)
COLLATERALTA	-4.6492	-3.9617	0.1414	0.1505
	(-0.56)	(-0.48)	(0.73)	(0.78)
LATA	2.0904*	2.2009*	0.0109	0.0140
	(1.74)	(1.87)	(0.61)	(0.79)
CONC	1.5861	1.5031	-0.0187	-0.0192
	(1.09)	(1.03)	(-1.20)	(-1.22)
GDPGR	1.0163	1.1459	-0.0306**	-0.0296**
	(0.79)	(0.90)	(-2.44)	(-2.42)
Year dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
m_1	-1.57	-1.59	-3.43***	-3.46***
m_2	-0.47	-0.47	0.63	0.70
# observations	13,651	13,651	13,612	13,612
# banks	2,361	2,316	2,317	2,317
# countries	92	92	92	92

Table 9

Cyclical effects of capital buffers, interest rate spreads, and regulatory regime

Regressions are estimated using the Arellano and Bond (1991) GMM difference estimator for panel data with lagged dependent variables. The dependent variable is the lending rate spread (LOANRATE) in Panel A and the deposit rate spread (COSTDEP) in Panel B. As explanatory variables we include one lag of the dependent variable ($LOANRATE_{i,t-1}$ or $COSTDEP_{i,t-1}$), the capital buffer in relative terms (RBUFFER) or total capital over risk-weighted assets (CAPITAL), the natural logarithm of bank assets (SIZE), the ratio of collateral to total bank assets (COLLATERALTA), the ratio of liquid assets to total bank assets (LATA), the ratio of total loans to total bank assets (TLNTA), the country's bank market concentration (CONC), and the growth of per capita GDP in the country (GDPGR). Basel II is a dummy variable that takes the value of 1 for the 2004-2007 period and zero otherwise. Regressions are estimated for 1990-2007. Year and country dummy variables are included for all the estimations but are not reported. T-statistics are in parentheses. ***, **, and * represent significance at the 1%, 5% and 10% levels, respectively.

	Panel A. Dependent variable: Lending Rate Spread		Panel B. Dependent variable: Deposit Rate Spread	
	(1)	(2)	(3)	(4)
$COSTDEP_{t-1}$	0.2324***	0.2341***	0.1551**	0.1591**
	(2.94)	(2.93)	(2.01)	(2.02)
RBUFFER	-0.4270**		-0.0053**	
	(-2.48)		(-2.58)	
CAPITAL		-0.0522**		-0.0006***
		(-2.19)		(-2.66)
SIZE	-1.2847	-1.4308*	-0.0287***	0.0292***
	(-1.52)	(-1.63)	(-3.56)	(-3.57)
COLLATERALTA	-1.3137	-1.3760	0.1950	0.1952
	(-0.15)	(-0.16)	(1.08)	(1.09)
LATA	2.5785**	2.5795**	0.0184	0.0172
	(2.25)	(2.32)	(1.06)	(0.99)
CONC	-2.6667	1.5924	-0.0186	-0.0165
	(-1.46)	(1.14)	(-1.27)	(-1.17)
GDPGR	1.3918	-6.0023*	-0.0639***	-0.0737***
	(0.97)	(-1.82)	(-3.75)	(-2.66)
RBUFFER x GDPGR	4.0501***		0.0308**	
	(3.53)		(2.58)	
RBUFFER x GDPGR x BASELII	2.2761		0.0702***	
	(1.14)		(2.77)	
CAPITAL x GDPGR		0.4203***		0.0021
		(2.67)		(1.57)
CAPITAL x GDPGR x BASELII		0.1643		0.0051***
		(0.90)		(2.67)
Year dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
m_1	-1.80*	-1.92**	-3.70***	-3.73***
m_2	-1.02	-0.70	0.98	1.27
# observations	13,651	13,651	13,612	13,612
# banks	2,316	2,316	2,317	2,317
# countries	92	92	92	92

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