Débats économiques et financiers N°11

Regulatory changes and the cost of equity: evidence from French banks

Olivier de Bandt, Boubacar Camara, Pierre Pessarossi, Martin Rose*

* Autorité de Contrôle Prudentiel et de Résolution. Corresponding author: pierre.pessarossi@acpr.banque-france.fr. Comments by C. Gourieroux, H. Rey, K. O'Rourke and L. Scialom on an earlier version are gratefully acknowledged.

SECRETARIAT GENERAL DE L'AUTORITE DE CONTROLE PRUDENTIEL ET DE RESOLUTION
DIRECTION DES ÉTUDES

Regulatory changes and the cost of equity: evidence from French banks

Olivier de Bandt, Boubacar Camara, Pierre Pessarossi, Martin Rose

March 2014

Regulatory changes and the cost of equity: evidence from French banks

Olivier de Bandt, Boubacar Camara, Pierre Pessarossi, Martin Rose

Abstract

In the paper, we first investigate the impact of an increase in capital requirements on the equity risk (beta) of listed banks in France. We find that an increase in capital ratios reduces banks' systematic risk. This leads to a decrease in shareholders' required return on equity, providing evidence in favour of the Modigliani-Miller theorem: the greater cost of capital due to higher capital ratios appears to be mitigated by the decrease in shareholders' expected return on equity. We then analyze the impact of liquidity position and find almost no evidence so far that investors take banks' liquidity risk into account.

Keywords: Modigliani-Miller, cost of equity, solvency ratios, liquidity ratios
JEL: G21, G28

Changements réglementaires et coût des fonds propres : le cas des banques françaises

Résumé

Dans cette étude, nous analysons dans un premier temps l'effet d'une augmentation des exigences en capital sur le risque des fonds propres (beta) des banques cotées françaises. Nous trouvons qu'une augmentation des ratios de capital réduit le risque systématique des banques. Cela conduit à une baisse de la rémunération exigée par les actionnaires sur les fonds propres. Ce résultat va dans le sens des prévisions du théorème de Modigliani et Miller : la hausse du coût moyen pondéré du capital due à une augmentation de la capitalisation est atténuée par une baisse de la rémunération exigée par les actionnaires sur les fonds propres. Nous analysons ensuite l'effet de la liquidité des banques et ne trouvons presque aucun élément montrant que les investisseurs prennent en compte le risque de liquidité.

Mots clés: Modigliani-Miller, cost of equity, solvency ratios, liquidity ratios
JEL : G21, G28

1. Introduction

In the wake of the subprime crisis, banking regulation has been significantly strengthened, in particular with the Basel III Accords. Regulatory authorities notably increased the solvency requirements and introduced liquidity requirements in order to increase the resilience of the banking system. Requiring banks to hold more equity may affect their cost of capital (equity plus debt). We investigate the long-term impact of an increase in capital on French listed banks' cost of equity and more generally on their cost of capital.

Modigliani and Miller (1958) show that under strict assumptions (absence of market imperfections, absence of taxation), the capital structure does not affect the overall funding costs of a firm. The intuition of that result is that investors are able to correctly price securities by taking into account their contribution to portfolio risk. In this case, investors would reduce their required return as firms become less risky when leverage decreases, *ceteris paribus*. However, the Modigliani-Miller theorem is not likely to hold exactly, especially for banks. Firstly, there is a difference in tax treatment between debt and equity. Contrary to dividends, interest payments are deductible from tax payment. But on the other hand, increasing leverage raises the probability of bank failure which may involve higher costs for the institution. Moreover, the agency conflicts between managers and shareholders also impacts the link between capital structure and cost of capital. In the particular case of banks, deposit insurance and other safety nets influence this relationship (Admati *et al.*, 2011).

Several empirical papers analyzed the relationship between banks' capital structure and their cost of capital. The Macroeconomic Assessment Group (2010) analyzed the potential impact of higher capital and liquidity requirements on growth over the next years. They notably conclude that a 1 percentage point increase in the target ratio of tangible common equity to risk-weighted assets would lead to a maximum decline in the level of GDP of about 0.19%. King (2010) studies the effect of Basel III capital and liquidity requirements on banks' credit spreads in 13 OECD countries. He estimates that a 1% increase in capital ratio implies an increase of 24bps in credit spread. Miles *et al.* (2012) notably find for listed UK banks that large increase in bank equity only results in a small long-run increase in the average cost of bank funding. Pollin (2011) also shows that increasing equity leads to a slight increase in the average cost of capital. Kashyap et al. (2010) find for a sample of US listed banks that an increase in the equity ratio reduces both the systematic and the idiosyncratic risk. The European Central Bank (2011) also finds that an increase in capital reduces the required return on equity with a partial application of the Modigliani-Miller theorem.

In the paper, we first investigate the impact of an increase in capital ratios on the equity risk (beta) of listed banks in France. We find that an increase in capital ratios reduces banks' systematic risk. This leads to a decrease in shareholders' required return on equity. Finally, we derive the effect of this capital increase on the banks' required return on equity and the average cost of capital.

Similarly to solvency ratios that signal better loss absorbency capacity, hence lower risk, the higher emphasis on liquidity is expected to be factored in by market participants. Besides this baseline relationship between banks' systematic risk and capital ratios, we investigate whether market participants integrate liquidity risk in their evaluation of banks' systematic risk. Both liquidity and solvency requirements are relevant, as financial crises reveal that banks may experience difficulties due to their liquidity position despite adequate capital position.

Our contribution to the literature is to add a new perspective on the relationship between banks' systematic risk and prudential regulation by taking the potential role of liquidity into account. French prudential regulation has been monitoring liquidity risk by imposing a minimum liquidity ratio since 1988. The existence of a liquidity regulation prior to the financial crisis and discussions regarding liquidity risk in the future Basel III framework gives us the opportunity to test how liquidity affects banks' risk and whether this has been changed with the financial turmoil. Thus this paper, in complement to the estimation of the role of capital on banks' risk assesses whether market participants take into account the liquidity position of banks using a novel balance sheet and regulatory database.

On the basis of such a relationship our objective is to bring evidence on the effect of Basel III new capital and liquidity requirements. However, such an attempt should be taken with caution as we need to keep several caveats in mind: Basel III is not only an increase in the quantity but also the quality of regulatory capital; the results are affected by the crisis environment. In addition, a significant fraction of the sample period includes the financial crisis, characterized by several shocks affecting banks' stock prices, inducing an increase in the cost of equity.

The remainder of the paper is organized as follows. Section 2 describes the data and methodology. Section 3 describes the results. Robustness checks are discussed in section 4. Section 5 measures the impact overall cost of capital.

2. Data and methodology

In order to assess the impact of changes in regulatory capital requirements, we estimate the relationship between banks' cost of capital and regulatory capital, relying on the CAPM approach to assess the cost of equity.

$$E(\tilde{r}_{it}) = r_{ft} + \beta_{K,i}\left[E(\tilde{r}_{Mt}) - r_{ft}\right], \quad (1)$$

where $\beta_{K,i}$ measures the correlation between the bank i's equity return and the market return and excess return $E(\tilde{r}_{Mt}) - r_{ft}$ is the excess return with respect to the risk-free rate.

The advantage of the CAPM methodology is that it is widely used notably by market participants as well as supervisors in other countries in order to assess banks' riskiness. We implement therefore such an approach, although there are some limitations. First, historical data are usually not available for a long time-span as regulation changes over time. Second the particular structure of the French banking system with a large proportion of non listed firms prevents from implementing the CAPM methodology on the whole banking sector even if these listed banks hold the major part of the French banks' total asset. Another criticism generally addressed to this model is that it does not take into account the imperfections of the capital market (borrowing cost and constraints, restrictions on short sales, and differences in assets taxation)

Data and methodology are described successively.

2.1. Data

Our sample covers the period 2005-2013 for five major French listed banks with a total asset a little more than 5 trillion in June 2013.[2] For comparison, Miles et al (2012) use seven UK banks. The Bloomberg database is used to get stock price information. We compute daily stock returns over the period 2005–2013 for each bank in our sample. We recursively estimate the beta of equity for each bank in each semester by regressing its stock returns on a market index returns. The SBF250 index return is used as a proxy for market return.[3] Figure 1 shows the evolution of the unweighted average of banks' beta over time.

[2] Namely BNP Paribas, Crédit Agricole SA (which is only a proxy for Credit Agricole Group), IXIS Corporate and Investment Bank (not listed after 2006), Natixis and Société Générale.

[3] The beta estimates are closely similar to those obtained using other market return indices such as the CAC 40 index and the SBF 120 index. The SBF 250 provides regressions with an average R^2 slightly higher than other market indices, hence our choice.

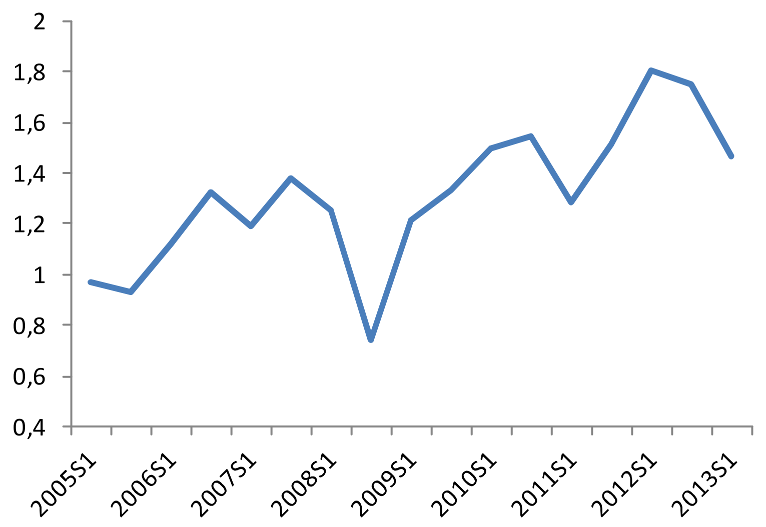

Fig. 1: Average betas for a sample of French listed banks

On average, the betas fluctuate around the value of 1 between 2005 and 2008. After the beginning of the crisis, an upward trend can be observed as the betas tend to continuously increase almost reaching the value of 2. It confirms that, during the crisis, banks' stock returns tend to over-react to market fluctuations. The average betas decrease in the second half of 2012.[4]

We use a novel balance sheet and regulatory database assembled by the *Autorité de Contrôle Prudentiel et de Résolution* (ACPR) – the French Supervisory Authority – on the basis of confidential accounting and prudential data. Over the period 2005-2013, the frequency of data is bi-annual[5]. To estimate the link between capital ratios and banks' cost of capital, we match our betas with several measures of banks' capital ratios. We employ three accounting capital ratios definitions and two regulatory capital ratios definitions. However, results found using regulatory capital ratios definitions have to be taken with more caution since the regulatory definition of capital and risk-weighted assets have changed during the period considered (Basel 1 with market risk, Basel 2, Basel 2.5). Each of these capital ratio definitions are used in turn to investigate whether it affects the risk of banks' equity. Regulatory capital ratio measures cannot be *stricto sensu* linked to the Modigliani-Miller framework as they can differ from accounting capital ratios. However, as they should reflect banks' riskiness in the perspective of the regulator, they are of clear interest for our analysis. Indeed, if market participants value the information provided by these regulatory measures, they should acknowledge that an increase in regulatory capital ratios implies a lower risk for the bank. As expected

[4] In July 2012, ECB President Mario Draghi announced that "within our mandate the ECB is ready to do whatever it takes to save the euro" which is known as marking an halt to the eurozone crisis, hence provided a very significant support to euro area banks.

[5] The frequency of balance sheet data is only annual before 2005. Even though the sample period limit our sample size, it presents the advantage of being homogenous in terms of accounting standards as banks have switched to IFRS norms in 2005. We will address a strategy to increase the sample size in our robustness checks section to check whether the results hold on a longer period.

returns are based on banks' future profits discounted with a rate depending on risk, we should observe a negative association between regulatory capital ratios and betas.

The first set of three accounting measures are the capital ratio *(CR)*, the capital ratio without interbank market assets *(CR w/o IB)* and the capital ratio with off-balance sheet items *(CR w/ OBS)*. *CR* is simply computed as book value of equity over book value of total assets. *CR w/o IB* is computed as: book value of equity / (Total assets – Interbank market assets). Here the indicator excludes interbank assets from total assets, with a view to balance interbank activity on the asset and liability side. Interbank market activities are indeed distinct from banks' core function of providing credit to non-financial institutions. Investors might focus their assessment of risks excluding these particular assets. *CR w/ OBS* is computed as book value of equity / (Total assets + Off-balance sheet items). Off-balance sheet activities have played an important role in the risk borne by banks, especially during the crisis. This measure of capital ratio is expected to take into account this particular feature of banks' activities.[6] Figure 2 shows the evolution of those three measures of accounting capital ratios in our sample.

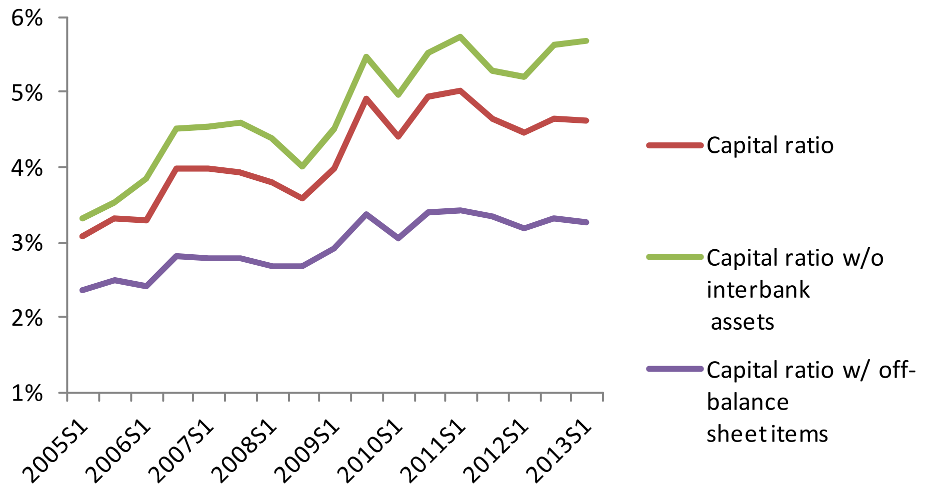

Fig. 2: Average accounting capital ratios across major French listed banks

The average accounting capital ratio also reveals an upward trend over the period 2005–2013. Our alternative measures also appear to be closely related over the whole period.

Our second set of regulatory capital ratios are tier-1 regulatory capital ratio (*T1CR*) and total regulatory capital ratio (*TCR*). Tier-1 regulatory capital ratio is computed as tier-1 capital over risk-weighted assets. Total regulatory capital ratio is computed as tier-1 + tier-2 + tier-3 capital over risk-weighted assets. Figure 3 shows the evolution of those two regulatory capital ratio measures.

[6] The Basel III leverage ratio takes into account banks' off-balance sheet activities by affecting weights that depend on the riskiness of these activities.

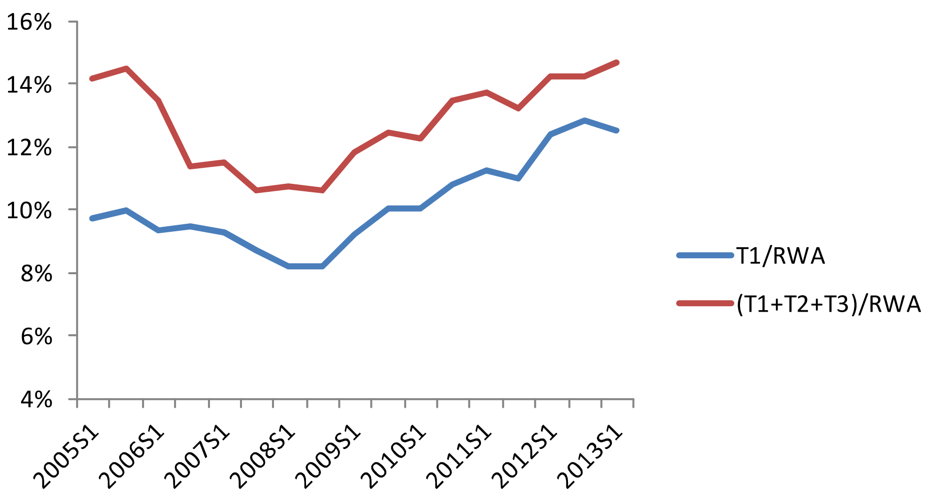

Fig. 3: Average regulatory capital across major French listed banks

A decrease can be observed before the financial crisis. A continuous increase takes place afterwards. One should also note that the definition of regulatory capital ratios change in 2008 with French banks adopting the Basel 2 standards.

Besides this baseline relationship between the beta and capital ratios, we investigate whether market participants integrate liquidity risk in their evaluation of systematic risk. Indeed, the subprime crisis that began in 2007 revealed that banks may experience difficulties due to their liquidity position despite adequate capital position. This ushered in a subsequent overhaul of prudential regulation, with a much more significant emphasis on liquidity (e. g. in particular Basel III). The European sovereign crisis also recalled the importance of banking liquidity to the functioning of financial markets and the banking sector. Rapid changes in market conditions, with an increase in funding costs, might lead to fire sales particularly in the case of inadequate liquidity position. It is therefore useful to assess whether market participants paid more attention to liquidity risk. We construct therefore four liquidity measures. This first ratio (*Liquid ratio*) is the French regulatory measure which breaks down weighted liquid assets by liquidity needs over one month. This regulatory ratio has been in force since 1988 and has been reviewed in 2009. The second liquidity measure (*LC mat*) is based on the narrow liquidity creation measure proposed by Berger and Bouwman (2009). The liquidity creation measure reveal to what extent a bank performs assets transformation. The measure divides assets and liabilities in liquid, semi-liquid and illiquid categories and assign a weight to each category (see the annex for the attribution of weights and formula computation). A bank using liquid liabilities to finance illiquid assets will have a high liquidity creation measures as it performs a significant asset transformation. In that respect, a high liquidity creation measure indicates a more illiquid position for the bank. Liquidity creation is then normalized by bank's total assets. The third measure (*Liquidity 1 m*) divides assets with a maturity below one month by liabilities with a maturity below one month (excluding retail deposits) to take into account asset and liabilities maturity mismatches. Finally, we also compute a simpler ratio (*Assets 1m*) by dividing assets with a maturity below one month by total assets. Our liquidity measures share many treats with the Basel III Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR).[7] Note that the first, third and fourth indicators measure the liquidity position, while the second assess the illiquidity position.

Figure 4 and 5 shows the evolution of these liquidity measures over time. Note that these indicators were not observed by market participants, but are taken as proxies of the information available in the market regarding liquidity risk.

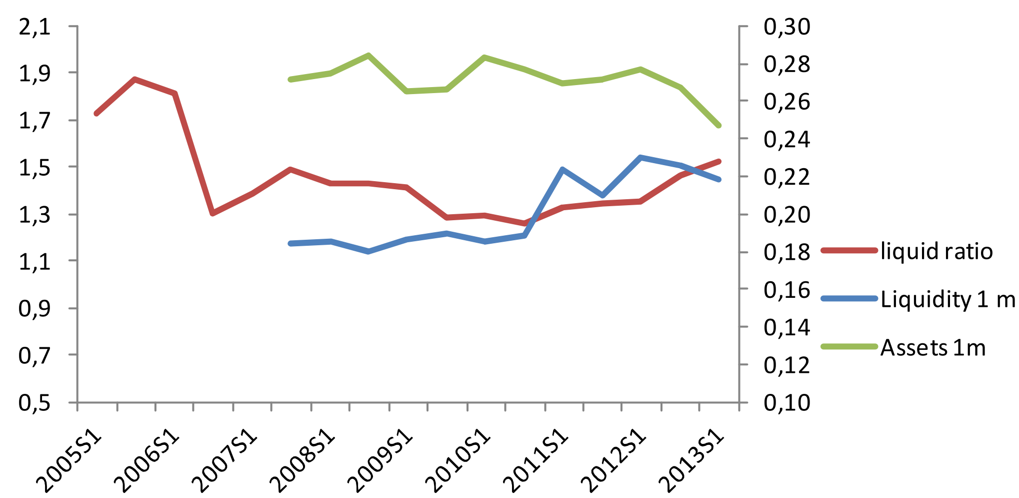

Fig. 4: Average regulatory liquidity ratio and one month maturity liquidity ratio across major French listed banks

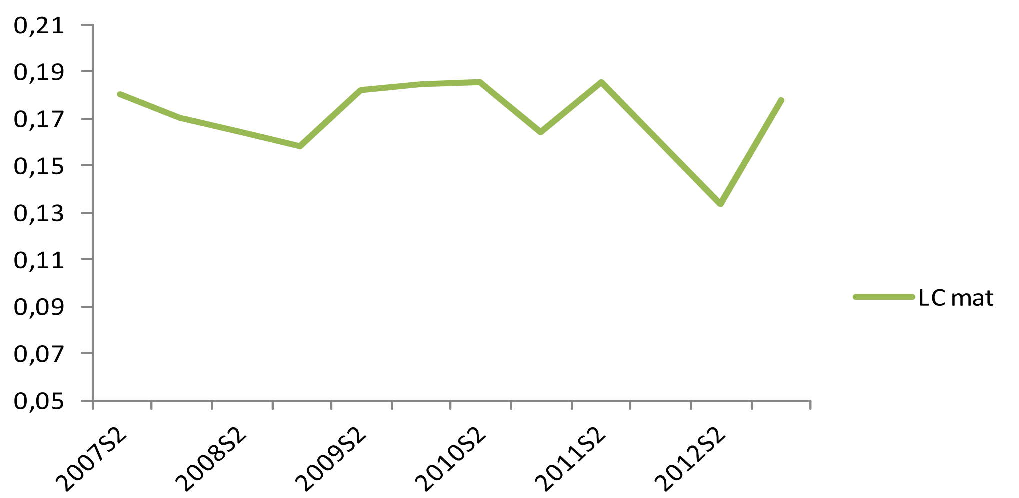

Fig. 5: Average one month maturity asset ratio and liquidity creation ratio

[7] The LCR aims to ensure that banks maintain an adequate level of high-quality liquid assets for a 30 calendar day time horizon under a significantly severe liquidity stress scenario specified by supervisors. The NSFR was developed to provide a sustainable maturity structure of assets and liabilities for a one-year time horizon. Data on these ratios are only available for banks participating to the Basel III Quantitative Impact Study since 2011.

In figure 4, *Assets 1m* values are shown according to the secondary axis. From June 2010, figure 4 features an upward trend in the regulatory liquidity ratio and the one month maturity liquidity measure. Figure 5 shows rather a downward sloping for *LC mat* until December 2012, which is consistent with the higher liquidity position in Figure 4.

Table 1 shows descriptive statistics for our variables. On average, the beta equals 1.30 meaning that banks' equity tend to overreact to market fluctuations. Of course, this result is strongly influenced by the crisis period as evidenced on figure 1. Accounting capital ratios of banks are on average slightly higher than 4% (at 4.11%). Meanwhile, regulatory capital measures are much higher (at 10.12% and 12.94% respectively for *T1CR* and *TCR*). Compliance with the regulatory liquidity ratio (*Liquid ratio*) is high at 147% on average. Moreover, about a quarter of total assets is composed of assets with maturity lower than one month (the mean *Assets 1m* is 27%). Data availability is more limited for *LC mat*, *Assets 1m* and *Liquidity 1m* due to the fact that information on maturity of assets and liabilities only start in end 2007 in our dataset.

Figure 1 for betas and figures 2 and 3 for accounting capital ratios and regulatory capital ratios exhibit an upward trend. If the series are non-stationary, a regression in levels can lead to a spurious relationship. To check whether this is the case, we follow Choi (2001) and Maddala and Wu (1999) by employing Fisher-type unit root tests for panel data on beta and our measures of capital. The null hypothesis is that all panels are non-stationary and the alternative H1 is that at least one panel is stationary. We employ the test with one lag as well as with and without a time trend. To mitigate the cross-sectional dependence, we subtract the mean our sample for each time period, following Levin et al. (2002). Our results fail to reject the null hypothesis, raising serious concerns on the validity to employ data on levels in our analysis. To cope with this issue, the data are first- differenced.[8] This procedure allows to obtain stationary series when data in level are I(1).

Table 2 shows the correlations for data in first-difference. The correlation between change in betas and change in capital ratio exhibits the expected negative sign. A change in accounting capital ratio is also positively correlated with a change in regulatory capital ratio. The changes in liquidity measures are reasonably correlated. The liquidity creation measure, which represents the level of asset transformation of the bank, is as expected negatively correlated with other liquidity measures.

[8] We also checked for the existence of cointegration between the equity betas and between equity betas and capitalization measures. We run the four error-correction based panel cointegration tests developed by Westerlund (2007). We find no evidence in favor of cointegration between the variables of the study.

2.2. Methodology

To assess the link between banks' cost of capital and capital ratios, we follow the methodology proposed by Miles et al. (2012). This approach relies on the theoretical framework of Modigliani-Miller in which capital structure does not affect the overall funding costs of a firm. In fact, the underlying assumption is that investors are able to correctly price securities by taking into account their contribution to portfolio risk. Consequently, investors would reduce their required return as firms become less risky when leverage decreases. All else being equal, an increase in banks' capital decreases the volatility of earnings for shareholders, which reduces their expected return on equity. The riskiness of banks' equity is estimated with the widely used capital asset pricing model (CAPM), where investors only require an expected return based on the systematic risk that cannot be diversified. Consequently, banks' equity riskiness is captured by the beta for equity capital which measures the correlation between banks' equity return and market return. In the Modigliani-Miller framework, an increase in capital should lead to a decrease in banks' equity betas. To measure this, we analyze the effect of our measures of accounting capital ratios and regulatory capital ratios on banks' equity betas.
As indicated above, since the unit-root tests reveal that series are non-stationary, we should not estimate this relation in levels. To measure empirically the link between betas and capital ratios, the alternative is to regress the change in betas on the change in capital ratios. Using first-differences instead of levels circumvents the problems relating to non-stationary series. We use our measures of capital ratios changes in turn in the regressions. The baseline model is as follows:

$$\Delta\beta_{i,t} = \alpha_i + \gamma . \Delta X_{i,t-1} + \sum_{p=2006}^{2013} Y_p + \varepsilon_{i,t}, \qquad (2)$$

where, for each bank *i* in semester *t*. $\Delta\beta_{i,t}$ is the change in estimated bi-annual equity beta with respect to the previous semester, computed as $\beta_{i,t} - \beta_{i,t-1}$. α_i is a constant bank-specific effect. $\Delta X_{i,t}$ is a measure of change in capital at the end of previous semester (t-1) with respect to semester t-2, computed as $X_{i,t-1} - X_{i,t-2}$. Taking a one-semester lag avoids possible endogeneity issues. [9]$\sum_{p=2006}^{2013} Y_p$ are yearly time dummy variables and $\varepsilon_{i,t}$ is a disturbance term.

Besides this baseline relationship between the banks' beta and capital ratios, we investigate the impact of the liquidity position on bank systematic risk using an augmented version of equation 2:

[9] A lower beta implies a decrease in the cost of capital, providing an incentive to issue equities, hence leading to an increase in the capital ratio in the current period.

$$\Delta\beta_{i,t} = \alpha_i + \gamma.\Delta X_{i,t-1} + \omega\Delta Z_{i,t-1} \sum_{p=2006}^{2013} Y_p + \varepsilon_{i,t}, \quad (3)$$

where $\Delta Z_{i,t-1}$ is a measure of the change in liquidity position.

If the liquidity position increases, banks are more likely to be less risky so that the coefficient of the regression of the coefficient on the liquidity position is also expected to be negative (and symmetrically positive for the illiquidity position of the Berger and Bouwman (2009) liquidity creation measure).

3. Main results

We consider the effect of solvency, the financial crisis, as well as liquidity.

The effect of solvency on the beta

Table 3 shows the results for the three accounting capital ratios measures and the two regulatory capital ratios measures. We provide results for OLS and fixed effects estimations. Standard errors are clustered at the bank level in order to correct for heteroscedasticity and serial correlation.[10]
A change in accounting capital ratios as measured by *CR* and *CR w/o IB* has a significant negative effect on the change in equity betas. Thus, increasing capital appears to reduce the riskiness of holding banks' equity. This result is in accordance with the findings of Miles et al. (2012) which show that increasing capital decreases the riskiness of banks' equity for a sample of British banks.[11] Concerning regulatory capital ratios, we find no evidence that they influence riskiness of the bank for market participants. However, as stated before, this result has to be taken with more caution as the regulatory definitions of capital and risk-weighted assets have changed throughout the period considered.

We also test an alternative log specification to the baseline model which allows us to correct for possible non-normality of the distribution of the variables. When taking the first difference of the logged model, the effect of a percentage change in capital ratio on beta equity is directly measured. Table 4 reports the result of our log specification. Our results mainly confirm those of the previous specification. The first two measures of accounting capital ratio (*CR*, *CR w/o IB)* are significant and negative, except for *CR* in the fixed-effect model. In the log specification model, total regulatory capital ratios is also significantly negative. Thus, this model provides some evidence that market

[10] We also run our models using Huber/White standard errors and bootstrapped standard errors with 50 replications. Results are qualitatively unchanged and even more statistically significant for capital measures. Thus, we report here the most conservative standard errors estimates.

[11] Miles et al. (2012) only rely on one measure of capital ratio, tier 1 over total assets, to investigate this effect.

participants also take into account changes in regulatory ratios to assess a bank's riskiness. In our results, a 1% increase in *TCR* implies a decrease in the range of 0.406-0.419% in beta equity.

Overall, our empirical findings stress that the amount of capital held by banks has an impact on the riskiness of their equity in accordance with the Modigliani-Miller framework. All else being equal, shareholders bear lower risk when the amount of a bank's capital increases. Evidence is mixed for the effect of regulatory capital ratios. However, an important change occurred in the definition of regulatory capital ratios during our sample period with notably the introduction of the Basel II capital requirements framework.

The effect of Basel II on the relation between regulatory capital ratios and beta equity

The introduction of Basel II requirements in 2008 changed the way regulators apprehended banks' riskiness. To assess whether regulatory capital ratios have had a different impact since this reform, we rerun our model on regulatory capital ratios and with an interaction term between these ratios and a dummy *Basel II* variable equal to 0 until 2008 and 1 thereafter. We are interested in the sign and significance of this interaction term. Table 5 reports the result of the regression of beta equity on regulatory capital ratios and the interaction term. The interaction term has a negative, but insignificant sign. This seems to suggest that the new regulatory framework had no particular impact on how market participants use regulatory capital ratios to assess banks' equity riskiness. Note that taking 2008 as the beginning of the crisis instead of 2009 does not affect the results.

The effect of banks' liquidity on the equity beta

The last financial crisis revealed strong weaknesses of banks in terms of liquidity. Banks' business models relying on short term market funding to finance long term illiquid assets suffered considerable losses during the financial turmoil.

In this subsection, we control the potential effect of banks liquidity on betas. We employ four different measures of liquidity to assess whether market participants take liquidity into account in the risk-pricing of banks' equity. Table 6 reports the results of models including the fist difference of capital ratio (ΔCR) and each liquidity measure in turns. We do not find that liquidity measures influence equity betas. This result stands in contrast with our result on capital ratios. Thus, market participants do not appear to integrate liquidity in their assessment of banks' riskiness. The results still holds if we include other capital ratios, as well as if we do not include capital measures at all in the regressions.

Potential explanation of this lack of relationship between liquidity and beta is that liquidity was not a great concern before the outbreak of the financial crisis in 2007 and data may be limited to evaluate the effect after the crisis. Furthermore, market data may be less informative in period of stress due to overreactions. In fact, the decision by each market participant takes the expectation of others' actions into account. Another explanation might lie in the fact that liquidity information used in our four measures is not easily obtained publicly.

It is plausible, however, that market participants have started to take into account liquidity after the financial crisis. The pre-financial crisis period was characterized by abundant and cheap liquidity for financial institutions, a statement that reversed after the collapse of Lehman Brothers. We thus also check whether liquidity has been taken into account since the financial crisis. We build interaction terms in order to distinguish the impact of liquidity ratios before and after the financial crisis.

Table 7 reports the results where we interact the first difference of the variable *Liquid ratio* with a dummy equal to 1 after the first semester of 2008.[12] This interaction measures the effect of an increase in liquidity after the Lehman collapse. We find limited support that market participants have started to take liquidity into account after the failure of Lehman Brothers. In the OLS specification, the interaction is negative and significant in the first three specifications, indicating that banks with higher liquidity are perceived as less risky since the second semester of 2008. This result is however no robust to the inclusion of bank fixed effects. It is not clear whether this lack of robustness is due to a lack of degrees of freedom in the fixed effects specifications. Overall, we find a limited support to the hypothesis that liquidity has started to matter for market participants' assessment of banks' equity riskiness.

4. Robustness checks

We also rerun our models using current values of accounting capital ratio measures and regulatory capital ratios measures instead of lagged values. To some extent, market participants might integrate the effect of a change in capital during the semester in which the beta equity is estimated. The regressions, not reported in the paper, show the same results than in our main estimations. To check a potential reverse causality when current measures of accounting capital ratios and regulatory capital ratios are employed, we perform a Granger-causality test with two lags. The test reveals that beta equity does not Granger-cause accounting capital ratios measures and regulatory capital ratios measures. The F-test with the null hypothesis that all lags of Δ*Beta* are equal to 0 is never rejected for

[12] This hypothesis can only be tested with the variable *Liquid ratio* as other liquidity measures start in December 2007 due to a lack of data availability on maturity of assets and liabilities.

all our measures; meanwhile the sum of lagged coefficients is also not significant. These results decrease the potential concern of a reverse causality in this robustness check.

Overall, these robustness checks confirm our main empirical findings that capital ratio decreases bank's beta equity. Based on the CAPM, it implies that expected returns of bank's equity falls when capital ratio increases. The next section estimates the magnitude of this fall in terms of cost of capital.

5. By how much does the cost of capital decrease when the capital ratio increases?

To estimate the magnitude of the effect of capital ratio on equity's cost of capital and the weighted average cost of capital (WACC), we start by estimating the expected return of banks' equity. The CAPM express the expected rate of return of equity, R_{EQ}, as follows:

$$R_{EQ} = R_f + \beta_{EQ} \times (R_M - R_f) \quad (3)$$

where β_{EQ} is bank's estimated equity beta, R_f the risk-free rate and R_M the equity market return. Using our average beta for the sample period 2005 – 2013 of 1.30 and assuming that the risk free rate, R_f, is equal to 5% and the equity market risk premium, $R_M - R_f$, is also equal to 5%,[13] we estimate the expected rate of return of equity at $5\% + 1.30 \times 5\% = 11.50\%$.

The WACC is the weighted average of cost of equity and cost of debt (assuming here that debt is risk-free):

$$WACC = R_{EQ} \times \frac{Equity}{Total\ assets} + R_f \times \frac{Debt}{Total\ assets} \quad (4)$$

Taking our sample mean value of 4.11% for *CR*, this leads to a $WACC$ equal to $11.50\% \times 4.11\% + 5\% \times 95.89\% = 5.27\%$. From our model, an increase in capital ratio leads to a fall in the expected rate of return of bank's equity that can be computed as follows

$$\Delta R_{EQ} = \Delta\beta_{EQ} \times \left(R_M - R_f\right) = \hat{\gamma}.\Delta X_{i,t-1} \times \left(R_M - R_f\right) \quad (5)$$

[13] We follow Miles et al. (2012) for these assumptions. According to Welch (2001), a 5% equity premium is in line with the average estimation of a large sample of economists.

Where $\hat{\gamma}$ is the coefficient estimated in the first-difference regressions of change of beta equity on change of capital ratios[14]. We first simulate the effect of an increase in capital ratio on the cost of equity using equation (5). In a second step, we use the new cost of equity and the weights in the WACC equation (4) to estimate how banks' total cost of funding changes.

Supposing that capital ratio doubles (i.e. in our example moves from 4.11% to 8.22%) and using our estimates from the OLS effect model (Table 3, column 1),[15] the fall in expected rate of return R_{EQ} is now equal to $(-0.090 \times 4.11) \times 5\% = -1.85\%$. Thus the new expected return of bank's cost of equity is 9.65%. The new WACC is equal $9.65\% \times 8.22\% + 5\% \times 91.78\% = 5.38\%$. Thus, after capital ratio doubles, the increase in average cost of capital is only $5.38\% - 5.27\% = 0.11\%$. Assuming that the Modigliani and Miller framework did not hold and capital ratio doubles, the increase of average cost of capital would be 5.53%. In this case, the cost of equity does not change with the increase in capital ratio. The WACC is consequently equal to $11.55\% \times 8.22\% + 5\% \times 91.78\% = 5.53\%$. Compared to the theoretical framework were cost of capital does not change when the capital ratio increases, the Modigliani-Miller offset is in our estimation about 54%.[16]

[14] We only consider the $\hat{\gamma}$ coefficient on the capital ratio first difference variable as the constant term is affected by our choice of the omitted time dummy variable. Moreover, we want to assess the *ceteris paribus* effect of a change in capital ratios.

[15] The OLS effect model estimates are the lowest of the two model specifications. It thus leads to the most conservative evaluation of the effect of capital ratio on banks' cost of equity.

[16] The theoretical offset from Modigliani-Miller is 5.53-5.27 = 0.26%. The actual offset is only 5.53-5.38=0.15%, or about 0.15/0.26=54% of the theoretical offset predicted by Modigliani-Miller.

6. Conclusion

This paper analyzes the role of higher capital and liquidity ratios on banks' riskiness over the period 2005-2013. We test the effect of higher capital ratios and regulatory capital ratios on banks' equity beta. We also assess whether market participant take into account the role of banks' liquidity when assessing the systematic risk of the bank. Our results show that an increase in capital ratios decreases banks' equity beta in line with former studies on the topic. This result echoes the theoretical predictions of the Modigliani-Miller framework. Under some assumptions, we estimate that after capital ratio doubles, the decrease in required return on equity is at least 1.85%. This leads to a modest increase in WACC of 0.11%. In contrast, we find limited support for a similar effect of regulatory capital ratios on banks' equity beta, but this result should be interpreted with care due to the changes in risk-weighted definitions of assets over the period. Finally, we find hardly any evidence that market participants have taken into account liquidity when assessing banks' riskiness.

References

Admati A. R., De Marzo P. M., Hellwig M. F., Pfeiderer P. (2011), "Fallacies, Irrelevant facts, and Myths in the Discussion of Capital Regulation: Why Bank Equity is *Not* Expensive", *mimeo, https://gsbapps.stanford.edu/researchpapers/library/RP2065R1&86.pdf*.

Berger, A.N., and Bouwman, C.H.S. (2009). Bank Liquidity Creation, *Review of Financial Studies*, 22, 3779-3837.

Choi, I., 2001, *Unit root tests for panel data*, Journal of International Money and Finance, 20, 249–272.

European Central Bank (2011), *Special features A*: *Common equity capital, banks' riskiness and required return on equity*, Financial Stability Review, December, 125-131.

Kashyap, K., Stein J., and Hanson, S. (2010): *An analysis of the impact of 'substantially heightened' capital requirements on large financial institutions*, University of Chicago and Harvard Working Paper, May, http://chifl.shufe.edu.cn/upload/htmleditor/File/120916100241.pdf.

King M.R. (2010): "Mapping capital and liquidity requirements to bank lending spreads", BIS working papers N° 324.

Levin, A., Lin C.-F. and Chu C.-S.J. (2002), *Unit root tests in panel data: asymptotic and finite-sample properties*, Journal of Econometrics, vol. 108, 1-24.

Macroeconomic Assessment Group (2010), *Assessing the macroeconomic impact of the transition to stronger capital and liquidity requirements*, Bank for International Settlements, Basel.

Maddala, G.S. and Wu S., 1999, *A comparative study of unit root tests with panel data and a new simple test*, Oxford Bulletin of Economics and Statistics 61, 631–652.

Miles D.,Yang J. and Marcheggiano (2012) , *Optimal bank capital*, The Economic Journal 123.

Modigliani F. and Miller M. (1958), *The cost of capital, corporation finance and the theory of investment*, American Economic Review, vol. 48 (3), 261-97.

Pollin J-P (2011), *La nouvelle régulation bancaire microprudentielle: principes, incidences et limites*, Revue d'Économie Financière.

Welch, I. (2001), *The equity premium consensus forecasts revisited*, Cowles Foundation, Discussion Paper No. 1325

Westerlund, J. (2007), *Testing for error correction in panel data*, Oxford Bulletin of Economics and Statistics, 69, 709-748.

Table 1
Descriptive statistics

This table presents main descriptive statistics for the period 2005 - 2012. *Beta* is estimated using the SBF250 index as the market return. *CR* is computed as book equity over book total assets. *CR w/o IB* is computed as book equity over book total assets minus interbank market assets. *CR w/ OBS* is computed as book equity over book total assets plus off-balance sheet items. *T1CR* is computed as tier 1 capital over risk-weighted assets. *TCR* is computed as tier 2 capital over risk-weighted assets. Data frequency is bi-annual.

Variable	N	Mean	Median	SD	Min	Max
Beta	76	1.30	1.32	0.34	0.28	1.98
CR (%)	76	4.11	4.33	0.97	1.22	5.81
CR w/o IB (%)	76	4.65	4.92	1.14	1.3	6.31
CR w/ OBS (%)	71	2.95	3.16	0.68	1.02	4.38
T1CR (%)	76	10.12	9.49	2.3	6.85	16.52
TCR (%)	76	12.94	11.85	2.94	9.91	24.46
Liquid ratio (%)	76	147	133	47	125*	149*
LC mat (%)	48	17	20	7	3	27
Assets 1m (%)	48	27	25	15	6	49
Liquidity 1m (%)	48	130	121	41	69	250

** 1st and 3rd quartile instead of, respectively, Min and Max due to confidentiality of this data.*

Table 2
Correlation matrix in first difference

	ΔBeta	ΔCR	ΔCR w/o IB	ΔCR w/ OBS	ΔT1CR	ΔTCR	ΔLiquid ratio	ΔLC mat	ΔAssets 1m
ΔBeta	1								
ΔCR	-0.09	1							
ΔCR w/o IB	-0.18	0.93***	1						
ΔCR w/ OBS	0	0.95***	0.89***	1					
ΔT1CR	0.09	0.32***	0.27**	0.33***	1				
ΔTCR	0.02	0.33***	0.25**	0.30**	0.81***	1			
ΔLiquid ratio	0.01	-0.00	0.04	-0.01	0.22*	0.13	1		
ΔLC mat	0.19	-0.01	-0.06	0.11	-0.22	-0.15	0.03	1	
ΔAssets 1m	-0.06	0.19	0.18	0.20	0.18	0.17	0.15	-0.22	1
ΔLiquidity 1m	-0.02	0.21	0.22	0.16	0.35**	0.21	0.17	-0.46***	0.30*

Table 3
First difference: beta, accounting and regulatory capital ratio measures

This table reports regressions of a change in beta on a change on alternative definitions of capital ratios. *Beta* is estimated on a bi-annual frequency using the SBF250 index for the market return. *CR* is computed as book equity over book total assets. *CR w/o IB* is computed as book equity over book total assets minus interbank market assets. *CR w/ OBS* is computed as book equity over book total assets plus off-balance sheet items. *T1CR* is computed as tier 1 capital over risk-weighted assets. *TCR* is computed as tier 2 capital over risk-weighted assets. The frequency of data is bi-annual. Clustered standard errors at the bank level are reported in parentheses. ***, ** indicate significance respectively at 1, 5 percent.

	ΔBeta equity									
	OLS					Bank Fixed Effects				
VARIABLES										
ΔCR	-0.090**					-0.100**				
	(0.021)					(0.029)				
ΔCR w/o IB		-0.105***					-0.115**			
		(0.021)					(0.027)			
ΔCR w/ OBS			-0.110					-0.136		
			(0.065)					(0.071)		
ΔT1CR				-0.006					-0.011	
				(0.012)					(0.015)	
ΔTCR					-0.012					-0.014
					(0.011)					(0.011)
Constant	-0.067	-0.069	-0.064	-0.034	-0.035	-0.098	-0.103	-0.096	-0.056	-0.058
	(0.037)	(0.036)	(0.045)	(0.040)	(0.039)	(0.062)	(0.064)	(0.072)	(0.058)	(0.058)
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	71	71	61	71	71	71	71	61	71	71
R^2	0.427	0.451	0.522	0.405	0.407	0.432	0.460	0.532	0.407	0.409
N. of banks	5	5	5	5	5	5	5	5	5	5

Table 4
First difference: beta, accounting and regulatory capital ratio measures (Log specification)

This table reports regressions of a change in log beta on a change on alternative definitions of log capital ratios. *Beta* is estimated on a bi-annual frequency using the SBF250 index for the market return. *CR* is computed as book equity over book total assets. *CR w/o IB* is computed as book equity over book total assets minus interbank market assets. *CR w/ OBS* is computed as book equity over book total assets plus off-balance sheet items. *T1CR* is computed as tier 1 capital over risk-weighted assets. *TCR* is computed as tier 2 capital over risk-weighted assets. The frequency of data is bi-annual. Clustered standard errors at the bank level are reported in parentheses. **, and * indicate significance respectively at 5 and 10 percent.

	Δ(log Beta equity)									
	OLS					Bank Fixed Effects				
VARIABLES										
Δlog(CR)	-0.486*					-0.597				
	(0.202)					(0.314)				
Δlog(CR w/o IB)		-0.518**					-0.672*			
		(0.155)					(0.308)			
Δlog(CR w/ OBS)			-0.532					-0.670		
			(0.322)					(0.424)		
Δlog(T1CR)				-0.210					-0.323	
				(0.293)					(0.380)	
Δlog(TCR)					-0.406*					-0.469**
					(0.151)					(0.162)
Constant	-0.100	-0.096	-0.105	-0.066	-0.073	-0.156	-0.161	-0.159	-0.106	-0.110
	(0.048)	(0.045)	(0.055)	(0.054)	(0.059)	(0.114)	(0.124)	(0.124)	(0.101)	(0.104)
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	71	71	61	71	71	71	71	61	71	71
R^2	0.431	0.448	0.532	0.397	0.404	0.451	0.481	0.558	0.406	0.411
N. of banks	5	5	5	5	5	5	5	5	5	5

Table 5
Effect of Basel II change in regulatory requirements

This table reports regressions of a change in beta on a change on regulatory capital ratios taking into account the shift to Basel II regulation in beginning 2008. The left column reports results for the general specification. The right column reports results for the log specification. *Beta* is estimated on a bi-annual frequency using the SBF250 index for the market return. *T1CR* is computed as tier 1 capital over risk-weighted assets. *TCR* is computed as tier 2 capital over risk-weighted assets. Basel II is a dummy variable equal to 0 before 2008 and 1 after 2008. The frequency of data is bi-annual. Clustered standard errors at the bank level are reported in parentheses. ***, **, and * indicate significance respectively at 1, 5 and 10 percent.

	ΔBeta equity							
	General specification				Log specification			
VARIABLES	OLS		Bank FE		Bank FE		Bank RE	
ΔT1CR	-0.012		-0.021**		-0.466***		-0.737***	
	(0.006)		(0.007)		(0.086)		(0.066)	
ΔTCR		-0.0001		-0.005		-0.248		-0.469*
		(0.006)		(0.006)		(0.171)		(0.173)
ΔT1CR × Basel II	0.013		0.025		0.517		0.806	
	(0.039)		(0.041)		(0.501)		(0.517)	
ΔTCR × Basel II		-0.024		-0.019		-0.222		0.000
		(0.022)		(0.023)		(0.194)		(0.218)
Constant	-0.032	-0.036	-0.053	-0.057	-0.060	-0.072	-0.103	-0.110
	(0.041)	(0.042)	(0.056)	(0.061)	(0.045)	(0.064)	(0.086)	(0.106)
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	71	71	71	71	71	71	71	71
R^2	0.406	0.410	0.410	0.411	0.406	0.405	0.428	0.411
N. of banks	5	5	5	5	5	5	5	5

Table 6
First difference: beta and liquidity measures

This table reports regressions of a change in beta on a change on capital ratio and alternative definitions of bank liquidity. *Beta* is estimated on a bi-annual frequency using the SBF250 index for the market return. *CR* is computed as book equity over book total assets. *Liquid ratio* is the French prudential liquidity ratio. *LC cat* is the narrow liquidity creation index proposed by Berger and Bouwman (2009) defined by categories. *LC mat* is the narrow liquidity creation index proposed by Berger and Bouwman (2009) defined by maturities. *Assets 1m* is computed as assets with less than 1 month maturity over total assets. The frequency of data is bi-annual. Clustered standard errors at the bank level are reported in parentheses. ***, ** indicate significance respectively at 1, 5 percent.

	ΔBeta equity							
	OLS				Bank Fixed Effects			
VARIABLES								
ΔCR	-0.092**	-0.092	-0.086	-0.094	-0.100**	-0.103	-0.093	-0.103
	(0.023)	(0.053)	(0.057)	(0.059)	(0.031)	(0.059)	(0.061)	(0.061)
ΔLiquid ratio	0.081				0.012			
	(0.124)				(0.171)			
ΔLC mat		1.176				1.291		
		(1.141)				(1.061)		
ΔAssets 1m			-0.536				-0.736	
			(1.781)				(1.739)	
ΔLiquidity 1m				0.004				-0.007
				(0.229)				(0.257)
Constant	-0.076	-0.509**	-0.520**	-0.522**	-0.098	-0.510***	-0.520**	-0.523***
	(0.051)	(0.095)	(0.103)	(0.100)	(0.063)	(0.080)	(0.092)	(0.087)
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	71	44	44	44	71	44	44	44
R^2	0.431	0.567	0.540	0.537	0.432	0.581	0.550	0.545
N. of banks	5	5	5	5	5	5	5	5

Table 7
First difference: beta and bank liquidity in before and after Lehman brothers failure

This table reports regressions of a change in beta on a change on bank liquidity and capital measures. *Beta* is estimated on a bi-annual frequency using the SBF250 index for the market return. *CR* is computed as book equity over book total assets. *CR w/o IB* is computed as book equity over book total assets minus interbank market assets. *CR w/ OBS* is computed as book equity over book total assets plus off-balance sheet items. *T1CR* is computed as tier 1 capital over risk-weighted assets. *TCR* is computed as tier 2 capital over risk-weighted assets. *Liquid ratio* is the French prudential liquidity ratio. Δ*Liquid ratio*×*Crisis* is the interaction between the first difference of *Liquid ratio* and a dummy variable equal to 1 after the failure of Lehman brothers. The frequency of data is bi-annual. Clustered standard errors at the bank level are reported in parentheses. ***, ** indicate significance respectively at 1, 5 percent.

	ΔBeta equity									
	OLS					Bank Fixed Effects				
VARIABLES										
ΔCR	-0.112**					-0.113**				
	(0.030)					(0.033)				
ΔCR w/o IB		-0.121**					-0.122**			
		(0.028)					(0.029)			
ΔCR w/ OBS			-0.151*					-0.156*		
			(0.068)					(0.065)		
ΔT1CR				-0.020*					-0.021**	
				(0.007)					(0.007)	
ΔTCR					-0.017					-0.017
					(0.012)					(0.012)
ΔLiquid ratio	0.316*	0.334*	0.322*	0.313	0.276	0.332	0.326	0.347	0.354	0.308
	(0.138)	(0.153)	(0.136)	(0.148)	(0.142)	(0.242)	(0.278)	(0.248)	(0.254)	(0.239)
ΔLiquid ratio×Crisis	-0.441*	-0.454*	-0.438*	-0.397	-0.354	-0.461	-0.448	-0.461	-0.440	-0.383
	(0.189)	(0.206)	(0.203)	(0.189)	(0.183)	(0.250)	(0.298)	(0.276)	(0.246)	(0.225)
Constant	-0.106	-0.107	-0.107	-0.060	-0.063	-0.108	-0.110	-0.106	-0.060	-0.061
	(0.079)	(0.078)	(0.090)	(0.080)	(0.080)	(0.079)	(0.080)	(0.091)	(0.074)	(0.074)
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	71	71	61	71	71	71	71	61	71	71
R^2	0.457	0.484	0.550	0.429	0.429	0.451	0.478	0.546	0.424	0.423
N. of banks	5	5	5	5	5	5	5	5	5	5

Annex: Classification of assets and liabilities for the narrow liquidity creation measure by maturity (*LC mat*)

	Maturity of assets (*weightings*)		
	> 1 year	< 1year and > 3 months	< 3 months
Financial assets held for trading	0.5	0	-0.5
Financial assets designated at fair value through profit or loss	0.5	0	-0.5
Available-for-sale financial assets	0.5	0	-0.5
Loans and receivables	0.5	0	-0.5
Held to maturity investments	0.5	0	-0.5
Derivatives - hedge accounting (positive fair value)	0.5	0	-0.5
Other assets	0.5	0	-0.5
Cash and balances with central banks			-0.5

	Maturity of liabilities (*weightings*)		
	> 1 year	< 1year and > 3 months	< 3 months
Financial liabilities held for trading	-0.5	0	0.5
Financial liabilities designated at fair value through profit or loss	-0.5	0	0.5
Financial liabilities measured at amortized cost	-0.5	0	0.5
Derivatives - hedge accounting (negative fair value)	-0.5	0	0.5
Other liabilities	-0.5	0	0.5
Deposits, loans and other financial liabilities vis-à-vis central banks	-0.5	0	0.5
Capital including minority interests	-0.5		

Note : Maturity greater than 1 year is considered illiquid, maturity between 3 months and 1 year is considered semi-liquid and maturity under 3 months is considered liquid

The Liquidity creation formula is as follows (for more details see Berger and Bouwman, 2009):

$$LC\ mat = \frac{0.5 \times Illiquid\ assets + 0 \times Semiliquid\ assets - 0.5 \times Liquid\ assets + 0.5 \times Liquid\ liabilities + 0 \times Semiliquid\ liabilities - 0.5 \times Illiquid\ assets}{Total\ assets}$$

Débats Économiques et Financiers

1. M. Dietsch and H. Fraisse, « De combien le capital réglementaire diffère-t-il du capital économique : le cas des prêts aux entreprises par les grands groupes en France », Février 2013.

2. O. de Bandt, N. Dumontaux, V. Martin et D. Médée, « Mise en œuvre de stress tests sur les crédits aux entreprises» Mars 2013

3. D. Nouy, « Les risques du Shadow banking en Europe : le point de vue du superviseur bancaire », Avril 2013.

4. L. Frey, S. Tavolaro, S. Viol, « Analyse du risque de contrepartie de la réassurance pour les assureurs français », Avril 2013

5. D. Nouy, « La réglementation et la supervision bancaire dans les 10 prochaines années et leurs effets inattendus », Mai 2013.

6. O. de Bandt, J-C. Héam, C. Labonne et S. Tavolaro, « Mesurer le risque systémique suite à la crise financière », Juin 2013

7. B. Camara, L. Lepetit, et A. Tarazi, « Capital Initial, Changements par Composantes du Capital Réglementaire et Risques Bancaires», Juin 2013

8. M. Brun, H. Fraisse, D. Thesmar, «Les effets réels des exigences en fonds propres», Aout 2013

9. M. Lé, «Mise en place d'un mécanisme de garantie des dépôts et risque bancaire : le rôle du levier financier », Décembre 2013

10. S. Tavolaro et F. Visnovsky, « Une analyse de la mesure SRISK comme outil de supervision », Janvier 2014

11. O. de Bandt, B. Camara, P. Pessarossi et M. Rose, « Changements réglementaires et coût des fonds propres : résultats sur les banques françaises », Mars 2014

Economic and Financial Discussion Notes

1. M. Dietsch and H. Fraisse, “How different is the regulatory capital from the economic capital: the case of business loans portfolios held by major banking groups in France”, February 2013

2. O. de Bandt, N. Dumontaux, V. Martin and D. Médée, “Stress-testing banks’ corporate credit portfolio”, March 2013

3. D. Nouy, « The risks of the Shadow banking system in Europe: the perspective of the banking supervisor », April 2013.

4. L. Frey, S. Tavolaro, S. Viol, « Counterparty risk from re-insurance for the French insurance companies», April 2013

5. D. Nouy, « Banking regulation and supervision in the next 10 years and their unintended consequences », May 2013.

6. O. de Bandt, J-C. Héam, C. Labonne and S. Tavolaro, « Measuring Systemic Risk in a Post-Crisis World », Juin 2013

7. B. Camara, L. Lepetit, and A. Tarazi, « Ex ante capital position, changes in the different components of regulatory capital and bank risk », Juin 2013

8. M. Brun, H. Fraisse, D. Thesmar, « The Real Effects of Bank Capital Requirements », August 2013

9. M. Lé, « Deposit Insurance Adoption and Bank Risk-Taking: the Role of Leverage », December 2013

10. S. Tavolaro and F. Visnovsky, « What is the information content of the SRISK measure as a supervisory tool ? », January 2014

11. O. de Bandt, B. Camara, P. Pessarossi and M. Rose, « Regulatory changes and the cost of equity: evidence from French banks », Mars 2014

61, rue Taitbout
75009 Paris
Téléphone : 01 49 95 40 00
Télécopie : 01 49 95 40 48
Site internet : www.acpr.banque-france.fr