IV SPECIAL FEATURES

A BANK CAPITAL IN EUROPE AND THE US

This Special Feature presents evidence on the level and cross-sectional dispersion of large publicly-traded banks' capital ratios, both regulatory and economic, in Europe and the US. It reveals that banks' holdings of capital are well in excess of the regulatory minimum and that there is a surprisingly large dispersion of banks' capital ratios, warranting further investigation. It then goes on to show that standard cross-sectional determinants of firm leverage also explain the capital structure of most large banks in the US and Europe. An important finding is that most banks seem to be optimising their capital structure in much the same way as firms.

INTRODUCTION

It is widely recognised that the financial sector is "special" compared with many other sectors of the economy. First, it faces a greater risk of instability, at both the level of individual financial intermediaries and markets and at the level of the overall financial system. In particular, systemic financial crises can have large adverse effects on growth. Second, many households using retail financial services may lack the financial knowledge and ability to collect information about the nature and risks of various financial contracts, as well as the viability of financial intermediaries to whom they entrust their savings. For these reasons, financial sectors tend to be subjected to more regulation and supervision than most other economic sectors.

Capital requirements are an important element of bank regulation. The argument is that: i) bank deposits should be ensured to protect depositors and ensure financial stability; and ii) banks must be required to hold a minimum amount of capital in order to mitigate the moral-hazard of deposit insurance.[1] Therefore, the standard view on banks' capital structures is that they are mainly driven by capital regulation, *"Banks also hold capital because they are required to do so by* regulatory authorities. Because of the high costs of holding capital [...], bank managers often want to hold less bank capital than is required by the regulatory authorities. In this case, the amount of bank capital is determined by the bank capital requirements."[2] Taken literally, this suggests that banks' capital ratios should be a constant close to the minimum capital requirement imposed by regulators. Moreover, little variation in banks' capital structures should be observed in the cross-section. If this is not the case, then the pertinent questions are: what are the drivers of banks' capital structures and what is the economic logic behind them? This Special Feature investigates these issues.[3]

BANK CAPITAL STRUCTURE: BACKGROUND

This Special Feature draws on recent literature, both academic and business-oriented, that calls into question whether capital requirements constrain banks. This literature shows that the capital levels of banks around the world are much higher than regulation would suggest.[4] In particular, it has been argued that bank capital ratios in the US are the outcome of market discipline rather than regulatory pressure.[5] The investors in the market that provide funds to banks, whether via equity or subordinated debt,

---

1   See, for example, M. Dewatripont and J. Tirole (1993), *The prudential regulation of banks,* MIT Press, Cambridge, MA.
2   See F. Mishkin (2000), *The economics of money, banking and financial markets (6th edition),* Addison Wesley, New York.
3   This Special Feature draws extensively on R. Gropp and F. Heider (2007), "The determinants of capital structure: Some evidence from banks", *ECB Working Paper,* forthcoming.
4   See for example J. Barth, G. Caprio and R. Levine (2003), *Rethinking Bank Regulation: Till Angels Govern*, Cambridge University Press, Cambridge and New York, UBS (2005), "Rethinking capital strategy", and F. Allen, E. Carletti and R. Marquez (2006), "Credit market competition and capital regulation", *University of Pennsylvania Working Paper.*
5   See A. Berger, R. DeYoung and M. Flannery (2007), "Why do large banking organizations hold so much capital?", *Board of Governors, FDIC and University of Florida Working Paper,* and M. Flannery and K. Rangan (2007), "What caused the bank capital build-up of the 1990s?", *Review of Finance,* forthcoming.

monitor them and price debt and equity accordingly.[6]

This Special Feature complements the market discipline view by suggesting that: i) the dispersion and level of banks' capital ratios is too high to be caused by regulatory concerns only; and ii) banks' capital structures are driven by the same factors as those of firms, which of course are not subject to capital regulation.

Once it has been established that banks' capital ratios are neither constant nor close to the regulatory minimum, the next step is to investigate the determinants of banks' capital structures. However, the banking literature offers little guidance in this regard, as it does not consider the significant cross-sectional variation in banks' capital ratios. By contrast, various corporate finance theories have produced a long list of factors that could drive firms' capital structures.[7] The empirical corporate finance literature has converged on the following set of variables as being able to predict reliably the leverage of non-financial firms in the cross-section.[8] First, leverage is positively related to size. It is usually argued that larger firms are safer, better known in the market, more exposed to agency problems or enjoy market power vis-à-vis investors, all of which may explain why larger firms have more debt in their capital structures.[9] Second, more profitable firms tend to have less leverage. This is consistent with the pecking-order theory and dynamic versions of the trade-off theory, while static versions of the trade-off theory predict that more profitable firms should lever up to shield their profits from corporate income tax.[10] Third, leverage is negatively related to a firm's market-to-book value ratio. Firms with high market-to-book value ratios have little free cash-flow as they appear to have numerous profitable investment opportunities. Such firms need less debt in their capital structure to prevent managers from investing the free cash-flow in negative net present value projects.[11] Firms experiencing high levels of growth also have more to lose in the event of bankruptcy and may suffer more from a debt-overhang problem, so they should

be relatively less leveraged.[12] Market timing can also explain the negative relationship between leverage and the market-to-book value ratio, as firms issue equity when it is overvalued.[13] Fourth, firms with more collateral have higher leverage. When more assets can be used as collateral, less is lost in distress, reducing the bankruptcy costs of debt. Moreover, collateral reduces the agency cost of debt since it makes it easier to monitor the use of assets. Fifth, firms

6   M. Flannery and S. Sorescu (1996), "Evidence of bank market discipline on subordinated debenture yields", *Journal of Finance,* 51, pp. 1347-1377, D. Morgan and K. Stiroh (2001), "Market discipline of banks: The asset test", *Journal of Financial Services Research*, 20, pp. 195-208, and R. Gropp, J. Vessala and G. Vulpes (2006), "Equity and bond market signals as leading indicators of bank fragility", *Journal of Money, Credit and Banking,* 38, pp. 399-428, all present evidence of market discipline in the banking sector.

7   For surveys, see M. Harris and A. Raviv (1991), "The theory of capital structure", *Journal of Finance*, 46, pp. 297-356, and M. Frank and V. Goyal (2007), "Trade-off and pecking order theories of debt", to appear in E. Eckbo (ed.). *Handbook of Corporate Finance: Empirical Corporate Finance, Vol.2*, Elsevier, Amsterdam.

8   See S. Titman and D. Wessels (1988), "The determinants of capital structure choice", *Journal of Finance,* 43, 1-19, R. Rajan and L. Zingales (1995), "What do we know about capital structure? Some evidence from international data", *Journal of Finance,* 50, pp. 1421-1460, and M. Frank and V. Goyal (2005), "Capital structure decisions: Which factors are reliably important?", *Financial Management,* forthcoming.

9   The agency problem of firms was first analysed by M. Jensen and W. Meckling (1976), "Theory of the firm: Managerial behaviour, agency costs and ownership structure", *Journal of Financial Economics,* 3, pp. 305-360.

10 For the pecking order theory, see S. Myers and N. Majluf (1984), "Corporate financing and investment decisions when firms have information that investors do not have", *Journal of Financial Economics,* 13, pp. 187-221, and S. Myers (1984), "The capital structure puzzle" *Journal of Finance,* 39, pp. 575-592. For the static trade-off theory, see M. Bradley, G. Jarrell and E. Kim (1984), "On the existence of an optimal capital structure: theory and evidence" *Journal of Finance*, 39, pp. 857-877. For the dynamic trade-off theory, see C. Hennessy and T. Whited (2005), "Debt dynamics" *Journal of Finance,* 60, pp. 1129-1165.

11 See M. Jensen (1986), "The agency costs of free cash flow: Corporate finance and takeovers", *American Economic Review,* 76, pp. 323-329.

12 The debt-overhang problem is attributed to S. Myers (1977), "Determinants of corporate borrowing", *Journal of Financial Economics,* 5, pp. 147-175. See also M. Barclay, E. Morrellec and C. Smith (2006), "On the debt capacity of growth options", *Journal of Business*, 79, pp. 37-59.

13 See M. Baker and J. Wurgler (2002), "Market timing and capital structure", *Journal of Finance,* 57, pp. 1-32. Another explanation is provided in A. Dittmar and A. Thakor (2007), "Why do firms issue equity?", *Journal of Finance,* 62, pp. 1-54. Firms issue equity when their valuation is high as this indicates agreement between managers and investors about the prospects of investment opportunities.

that pay dividends have less leverage.[14] One reason for this could be that paying dividends exposes firms to the scrutiny of capital markets and reduces the agency cost of equity.[15] Finally, a further reliable determinant of firms' leverage consists of the average leverage of their industry. But since this Special Feature considers just one industry, namely banking, this is not an issue here.[16]

All these arguments extend naturally to banks, unless the textbook view that banks' capital structures are predominately determined by capital regulation is adhered to. The following empirical analysis seeks to determine which view prevails.

DATA AND SURVIVORSHIP BIAS IN THE BANKSCOPE DATABASE

Selection bias is a problem encountered when using finance panel datasets. It is not correct to assume that the population of firms or banks remains constant over the time span of the sample. Firms and banks appear and disappear from the sample in a non-random way. The reason for entry and exit from the sample is often related to the issue that the researcher wants to explore, e.g. the link between firm/ bank characteristics and capital structure. A firm exits the sample, for example, when it goes bankrupt, which is linked to high leverage and low profitability.[17]

Special care has been taken here to eliminate survivorship bias in the Bankscope database compiled by Bureau van Dijk. The selection issue is particularly acute for this widely-used dataset because, in its most recent release of the database, the Bureau van Dijk deletes historical information on banks that no longer exist. For example, the 2004 release of Bankscope does not contain information on banks that did not exist in 2004, but which existed in 1999. Following a bank merger, for example, information about the target prior to the merger is lost. So, when the Banque National de Paris (BNP) acquired Paribas in 2000, forming the current BNP Paribas bank, the 2004 release of Bankscope

no longer contained information about Paribas prior to 2000. However, information about BNP prior to 2000 is contained in the database because it was the acquirer.

The survivorship bias in the Bankscope database is addressed in this analysis by reassembling the panel data set based on individual cross-sections using historical, archived releases of the database. The Bureau Van Dijk provides monthly releases of the Bankscope database. The last release of each year from 1991 to 2004 is used to provide information about banks in that year only. For example, information about banks in the sample in 1999 comes from the December 1999 release of Bankscope. This procedure also allows the magnitude of the survivorship bias to be quantified: 12% of the banks present in 1994 no longer appeared in the 2004 release of the Bankscope dataset.

The sample period starts in 1991 and ends in 2004. The sample is constructed to ensure that it contains the 100 largest publicly-traded commercial banks and bank-holding companies in the US and the same number of banks/bank-holding companies across 15 countries of the European Union.[18] Overall, the sample consists of 327 individual banks and 2,415 bank-year observations.[19]

---

14 See M. Frank and V. Goyal (2005), op.cit.
15 See F. Easterbrook (1984), "Two agency costs explanations of dividends", *American Economic Review*, 74, pp. 650-659.
16 For a more detailed analysis of the interaction between industry characteristics and firms' capital structure see P. MacKay and G. Phillips (2005), "How does industry affect firm financial structure?", *Review of Financial Studies*, 18, pp. 1433-1466.
17 For a discussion of this and other issues in empirical capital structure research, see I. Welch (2006), "Common flaws in empirical capital structure research", *Brown University Working Paper*.
18 The EU Member States in the sample are Austria, Belgium, Denmark, Germany, Spain, Finland, France, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Sweden and the United Kingdom.
19 Each year 200 banks are selected anew according to their book value of assets. There were less than 100 publicly traded banks in the EU at the beginning of the time period. There are no data for the US for 1991 and 1992.

Chart A.1 Distribution of banks' regulatory Tier 1 capital
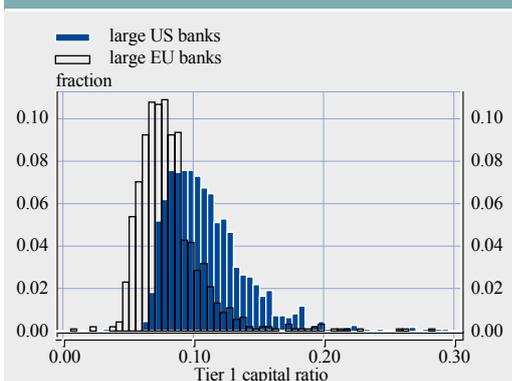
■ large US banks
☐ large EU banks
fraction

Sources: Bureau van Dijk (Bankscope) and ECB calculations.
Note: The chart shows the distribution of banks' Tier 1 capital ratio for 2007 bank-year observations in the sample (15 EU countries and the US) from 1991 to 2004. Information on the Tier 1 capital ratio is missing for 408 bank-year observations.

Chart A.2 Distribution of banks' economic equity capital
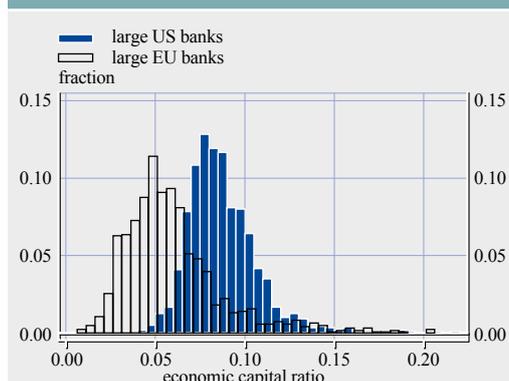
■ large US banks
☐ large EU banks
fraction

Sources: Bureau van Dijk (Bankscope) and ECB calculations.
Note: The chart shows the distribution of banks' book capital ratio (book equity divided by book assets) for the 2,415 bank-year observations in the sample (15 EU countries and the US) from 1991 to 2004.

DESCRIPTIVE EVIDENCE

Chart A.1 shows the distribution of the ratio of Tier 1 regulatory capital for the 100 largest publicly-traded banks in each the US and 15 EU Member States. The ratio (mostly) consists of equity, measured at book value, over risk-weighted assets. The large banks in the US and EU hold substantially more regulatory capital than the minimum of 4% specified in the Basel Capital Accord (Basel I).[20] The average regulatory capital was 11.1% in the US and 8.2% in the 15 EU countries. Moreover, there was a large variation in banks' capital ratios – they are not as uniformly close to the regulatory minimum as the quotation cited in the introduction of this Special Feature suggests.

Chart A.2 shows the distribution of the ratio of book equity to book assets. The ratio represents the real economic capital of a bank. This differs from the ratio shown in Chart A.1 in that the book value of assets as it appears in the bank's balance sheet replaces the risk weighted assets calculated for regulatory purposes in the denominator. The economic capital ratio is therefore an understatement of the regulatory Tier 1 capital ratio.

Even in terms of this more conservative measure – it is as if all assets were in the highest regulatory risk class, e.g. loans to companies – banks' capital levels were well in excess of the regulatory minimum. The average ratio of book equity to assets was 8.7% in the US and 6.2% in the 15 EU countries. Again, there is a surprising amount of dispersion of banks' capital ratios that is not in line with capital regulation being a first-order determinant of banks' capital structures.

Chart A.3 shows the evolution over time of banks' average capital ratios both in book and market values. The capital ratio in market values replaces book equity with market equity, i.e. the number of shares times the end-of-year stock price, and the market value of assets is the market value of equity plus the book value of debt. The market capital ratio can be interpreted as the market's forward-looking assessment of the net value of a bank.

20 For more information see, for example, Morgan Stanley (2003), "Bank capital A-Z". From 2008, European banks will adopt the new Basel II framework that may well shift the emphasis of the conclusions drawn in this Special Feature. For example, the new capital adequacy ratios may lead to less capital being held by banks.

Chart A.3 Banks' economic capital (1993-2004)
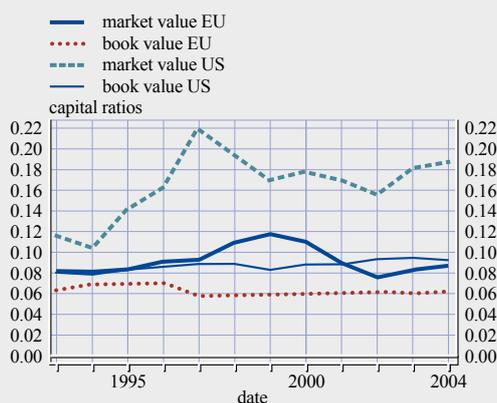
Sources: Bureau van Dijk (Bankscope) and ECB calculations.
Note: The chart shows the yearly average of banks' book capital ratios (book equity divided by book assets) and market capital ratios (where book equity is replaced by market equity, i.e. the number of shares times the end of year stock price, and the market value of assets is the market value of equity plus the book value of debt) for the 2,415 bank-year observations in the sample (15 EU countries and the US) from 1993 to 2004. The years 1991 and 1992 are not shown owing to the small number of observations.

The average book capital ratio is remarkably stable over the period 1993-2004 in both the US and the 15 EU Member States in the sample. It stood at 6% in the 15 EU countries and between 8% and 9% in the US. The average market capital ratio fluctuated by more and there seems to have been a build-up in the US in the late 1990s, with a subsequent decline after the peak in 1997. The market value of large banks in the 15 EU countries peaked later in 1999 and subsequently returned to the level of the early 1990s.

ECONOMETRIC EVIDENCE

In order to identify empirically the factors that explain bank capital ratios, a baseline specification is the following standard capital structure regression:

$$L_{ict} = \beta_0 + X_{ict-1}\beta_1 + Y_{ct}\beta_2 + c_c + c_t + u_{ict} \qquad (1)$$

To facilitate the comparison with the empirical literature on the capital structure of firms, the dependent variable L_{ict} is leverage, i.e. one minus the ratio of equity over assets in both book and market values. It therefore includes

debt and non-debt liabilities such as deposits.[21] Both book and market definitions of leverage have been used in the corporate finance literature and yield similar results.[22] However, the difference between book and market values offers an interesting angle for banks, since capital regulation is imposed on book and not on market capital. Hence, equation (1) is estimated based on both definitions to check whether, in the case of banks, standard corporate finance determinants continue to drive both measures of leverage similarly.

The explanatory variables are at the bank level, X_{ict-1}, and at the country level, Y_{ct}. The explanatory variables at the bank level that are considered include the market-to-book value ratio (the market value of assets, i.e. the number of shares times the end-of-year stock price plus the (book) value of liabilities, divided by the book value of assets), profitability (pre-tax profits plus interest expenses divided by the book value of assets), the logarithm of size (the book value of assets), collateral (total securities plus treasury bills, other bills, bonds, credit derivatives, cash, land and buildings and other tangible assets all divided by the book value of assets) and a dummy for dividend payers.

Measures of risk often fail to show up as a reliable factor in the corporate finance literature on firms' leverage.[23] Regulators, however, care about minimising the downside risk of banks. Hence, risk (the annualised standard deviation of daily stock returns times the equity-to-asset ratio in market values) is also added as an explanatory variable at the bank level to examine whether it is an important factor and whether it drives out the standard corporate finance determinants of leverage.

21 Such liability-to-asset ratios are advocated by I. Welch (2006), op.cit.
22 Exceptions are M. Barclay, E. Morrellec and C. Smith (2003), op.cit., who focus on book leverage and I. Welch (2004), op.cit., who argues for market leverage. Most studies, however, use both.
23 S. Titman and D. Wessels (1988) and M. Frank and V. Goyal (2005), op.cit.

Given the importance of macro-financial conditions for the financial performance of banks, the explanatory variables included at the country level comprised GDP growth, domestic stock market volatility and the spread between the three-month and the ten-year interest rate on domestic government bonds. Banks finance firms, so their business depends on firms' investment opportunities. It is therefore reasonable to expect that the business cycle, measured by the growth rate of domestic GDP, affects banks, and perhaps their capital structures. Similarly, a key function of banks is maturity transformation. Banks receive short-term deposits that they lend out long-term to firms and households. The spread between the three-month and the ten-year interest rate on domestic government bonds captures a possible impact of such intermediation on banks' leverage. Finally, the overall risk of the environment banks operate in, measured by the standard deviation of domestic stock market index returns, may also play a role.

The regression includes time and country fixed effects (c_t and c_c) to account for unobserved heterogeneity at the country level and across time that may be correlated with the explanatory variables. Standard errors are clustered at the bank level to account for heteroscedasticity and serial correlation of errors.[24]

Table A.1 presents the results of estimating equation (1) with different sets of explanatory variables. In columns (1) to (3) the dependent variable is market leverage, while in columns (4) to (6) the dependent variable is book leverage.

24 See M. Petersen (2007), "Estimating standard errors in finance panel data sets: comparing approaches", *Review of Financial Studies*, forthcoming.

Table A.1 Determinants of banks' capital ratio

Dependent variable	Market leverage			Book leverage		
Market-to-book ratio	-0.560***	-0.472***	-0.475***	-0.066***	-0.020	-0.020
se	0.034	0.036	0.037	0.016	0.015	0.016
Profits	-0.298***	-0.262***	-0.164	-0.210***	-0.192***	-0.174***
se	0.097	0.087	0.101	0.063	0.058	0.066
Log(Size)	0.006***	0.005***	0.005***	0.006***	0.006***	0.006***
se	0.001	0.001	0.001	0.001	0.001	0.001
Collateral	0.020	0.020**	0.023**	0.032***	0.032***	0.033***
se	0.012	0.010	0.010	0.009	0.008	0.008
Dividends	-0.019***	-0.019***	-0.020***	-0.009***	-0.009***	-0.009***
se	0.004	0.004	0.004	0.003	0.003	0.003
Log(Risk)		-0.024***	-0.024***		-0.013***	-0.013***
se		0.004	0.004		0.002	0.002
GDP growth			-0.010			-0.010
se			0.049			0.025
Term structure spread			0.004***			-0.000
se			0.001			0.001
Log(Stock market risk)			-0.011*			-0.006*
se			0.006			0.003
Number of observations	2,415	2,415	2,415	2,415	2,415	2,415
R²	0.72	0.78	0.78	0.32	0.48	0.48

Sources: Bureau van Dijk (Bankscope), Thomson Financial Datastream , IMF's World Economic Outlook and ECB calculations.
Note: The table presents the results of estimating equation (1). In columns (1)-(3) the dependent variable is market leverage and in columns (4)-(6) it is book leverage. All regressions include time and country fixed-effects and all explanatory variables are lagged one year (except dividends, GDP growth, the term structure spread and stock market risk). See the main text for the definition of variables. R^2 is the correlation between the fitted value of the dependent variable from the regression and its actual value in the data. Standard errors are adjusted for clustering at the bank level. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

Column (1) uses only the standard corporate finance determinants of leverage as explanatory variables. All the coefficients are statistically significant, except for collateral, and all have the same sign as in the corporate finance literature. Banks' leverage depends positively on size and collateral, and negatively on the market-to-book ratio, profits and dividends. Moreover, the elasticity of leverage for banks to the explanatory variables (not reported) is comparable to the elasticity of leverage for firms.[25] A 1% change in the market-to-book ratio decreases bank leverage by 0.683%. The elasticity of leverage to profits is -0.018 for banks. This means that a 1% increase in median profits, that is $7.3 million, decreases median liabilities by $250 million. This is an economically significant effect. Hence, it appears that the standard corporate finance determinants of capital structure also apply to banks' market leverage.

Column (4) reports that, as in the case of market leverage, regressing book leverage on the standard corporate finance determinants of capital structure produces estimated coefficients that are all statistically significant at the 1% level and all have the same sign as in studies of non-financial firms. Moreover, the magnitude of the coefficients and their elasticity (not reported) are again roughly comparable to the ones found for firms (except for collateral).[26] As in the corporate finance literature, large differences between the results for book and market leverage of banks are not detected. This does not support the hypothesis that regulatory concerns create a wedge between the determinants of banks' book and market capital structures.

Columns (2) and (5) show that banks with more volatile assets have significantly less leverage, both in book and market values. The negative coefficient on this measure of risk is consistent with both regulatory concerns and the corporate finance argument that debt is costly owing to the expected cost of bankruptcy. However, risk does not drive out the other variables. An F-test on the joint insignificance of all non-

risk coefficients is rejected. All coefficients from columns (1) and (4) remain statistically significant at the 1% level, except: i) the coefficient of the market-to-book value ratio on book leverage, which is not significant; and ii) the coefficient of collateral on market leverage, which is significant at the 5% level. The asset volatility lowers the coefficient on the market-to-book value ratio by two thirds. The reason for this is that risk strongly correlates positively with the market-to-book ratio (the correlation coefficient is 0.85).

Columns (3) and (6) present the results of estimating equation (1) when macro-economic explanatory variables are added. Controlling for macro-economic factors does not change the coefficients or the significance of the standard determinants of leverage. Stock market volatility is a significant macroeconomic determinant of both book and market leverage (at the 10% level). Similar to banks' individual risk, a riskier macroeconomic environment is associated with less leverage. A larger term structure spread is associated with higher market leverage, but not book leverage, and this effect is statistically significant at the 1% level. GDP growth is not found to be statistically significant. Once individual banks' asset risk is controlled for, adding macroeconomic factors is not particularly helpful in explaining the cross-sectional variation in banks' capital structures.

Although the standard corporate finance determinants of firm leverage also explain banks' capital structures in the whole sample, and therefore capital regulation does not appear to be of first-order importance for all banks, they could be less relevant for banks that are close to the regulatory threshold. Therefore the leverage of banks that have little discretionary capital, i.e. capital in excess of the regulatory threshold, should be examined. In this vein,

25 See, for example, Table 8, column 7, in M. Frank and V. Goyal (2005), op.cit., and Table 9, panel B, in R. Rajan and L. Zingales (1995), op.cit.
26 See for example Table 9, column 7, in M. Frank and V. Goyal (2005), op.cit., and Table 9, panel A, in R. Rajan and L. Zingales (1995), op.cit.

equation (2) builds on equation (1) and interacts all explanatory variables at the bank level with a dummy (*Below*) that is equal to one if a bank has less than 5% book capital in a given year.

$$L_{ict} = \beta_0 + X_{ict-1}\beta_1 + Below * X_{ict-1} + c_c + c_t + u_{ict} \quad (2)$$

The findings from estimating this equation are summarised in Table A.2 where the first column shows that for banks close to the regulatory threshold, the marginal impact of profits and dividends is not significantly different from zero.[27] The impact of size, risk and collateral

diminishes, but remains significant. The coefficient on the market-to-book ratio becomes significantly positive. The second column of Table A.2 shows that the results do not change for banks with less than 6% book capital. The standard corporate finance drivers of leverage weaken for banks that are close to the regulatory minimum. This lends credence to the interpretation that significant marginal effects of standard corporate finance variables imply that capital regulation is of second-order importance for most large publicly traded banks in the US and Europe.

CONCLUDING REMARKS

All in all, evidence on the level and cross-sectional dispersion of the capital ratios, both regulatory and economic, of large publicly-traded banks in Europe and the US shows that: i) banks' holdings of capital are well in excess of the regulatory minimum; and ii) there is a surprisingly large dispersion of banks' capital ratios, warranting further investigation. In addition, it is found that the standard cross-sectional determinants of firm leverage also explain the capital structure of most large banks in the US and Europe. This is true for both market and book leverage ratios. Most banks seem to be optimising their capital structure in much the same way as firms.

Table A.2 Determinants of banks' capital ratio

Dependent variable Book leverage		Below=below 5%	Below=below 6%
Market-to-book ratio		-0.021	-0.020
	se	0.014	0.014
Market-to-book ratio*Below		0.050***	0.048***
	se	0.015	0.013
Profits		-0.208***	-0.205***
	se	0.057	0.062
Profits*Below		0.174**	0.131*
	se	0.063	0.064
Log(Size)		0.004***	0.004***
	se	0.001	0.001
Log(Size)*Below		-0.001	-0.001
	se	0.001	0.001
Collateral		0.024**	0.027**
	se	0.008	0.009
Collateral*Below		-0.001	-0.015
	se	0.014	0.014
Dividends		-0.009**	-0.009**
	se	0.003	0.003
Dividends*Below		0.002	0.006
	se	0.006	0.005
Log(Risk)		-0.012***	-0.011***
	se	0.002	0.002
Log(Risk)*Below		0.004*	0.003*
	se	0.002	0.002
Number of observations		2415	2415
R²		0.65	0.69

Sources: Bureau van Dijk (Bankscope), Thomson Financial Datastream and ECB calculations.
Note: The table shows the result of estimating equation (2). It includes time and country fixed-effects and all explanatory variables are lagged one year (except dividends). The dependent variable is book leverage. In the first column, the dummy Below equals one if book capital is less than 5% for a bank in a given year. In the second column, it is one if book capital is less than 6%. See the main text for the definition of variables. The R² is obtained from a dummy variable regression to account for the fixed effects. Standard errors are adjusted for clustering at the bank level. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

27 Based on an F-test whether the sum of an explanatory variable and its interaction with the below dummy equals zero.