Jing Yang
jing.yang@bis.org

Kostas Tsatsaronis
ktsatsaronis@bis.org

Bank stock returns, leverage and the business cycle[1]

The returns on bank stocks rise and fall with the business cycle, making bank equity financing cheaper in the boom and dearer during a recession. This provides support for prudential tools that give incentives for banks to build capital buffers at times when the cost of equity is lower. In addition, banks with higher leverage face a higher cost of equity, which suggests that higher capital ratios are associated with lower funding costs.

JEL classification: G3, G21, G28.

Capital planning plays a key role in banks' business decisions. The cost of equity financing and return targets on shareholders' funds shape banks' capital allocation and product pricing. Given the importance of equity capital in absorbing losses, prudential regulators require banks to hold sufficient equity to cover risks. Regulation that motivates banks to raise equity financing when capital is cheap would promote the interests of long-term shareholders. All these considerations call for a better understanding of what drives the cost of bank capital. One way to gauge this cost of equity is to analyse expected stock returns.

In this special feature, we examine how expected equity returns vary across a sample of globally active banks and over time in 11 countries. We estimate the determinants of the rate of return on bank stocks using a standard equity pricing framework that decomposes share price risk into a systematic and an idiosyncratic component. The systematic component cannot be diversified away, and it is priced in the market in the sense of commanding higher expected returns. The opposite holds for the idiosyncratic component, which can be diversified away in sufficiently large portfolios and hence is not priced in the market.

We show that leverage and the state of the business cycle affect the systematic (priced) component of the risk of bank stocks. Systematic risk differs across the stages of the business cycle: it is lower near the top of the

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cycle and higher around the trough. We also find that higher leverage is systematically associated with higher average stock returns. However, leverage also boosts the idiosyncratic (non-priced) risk component of bank stock, increasing the required size of the portfolio that can neutralise this risk. Finally, all else equal, banks regarded as highly systemically important by international regulators tend to have a lower average stock return and, hence, a lower cost of equity finance.

The rest of this article is organised in three sections. The next section outlines the empirical framework and describes the data. The following one discusses the findings concerning the effect of the business cycle and bank characteristics on the expected returns of individual bank stocks. The final section concludes.

Banks as equity investments

Bank stock variability …

Graph 1 depicts the performance of bank stocks relative to the broad market index for a number of advanced market economies. There is a common pattern across many markets. Bank stocks performed strongly between 1990 and 2007, with a brief reversal around the turn of the century, but they hugely underperformed during the past four years in the wake of the financial crisis. This pattern is very pronounced in the United States and the United Kingdom, but less so in continental Europe. The protracted period of strains in the Japanese financial system during the 1990s results in a different picture for the first half of the period shown in the graph.

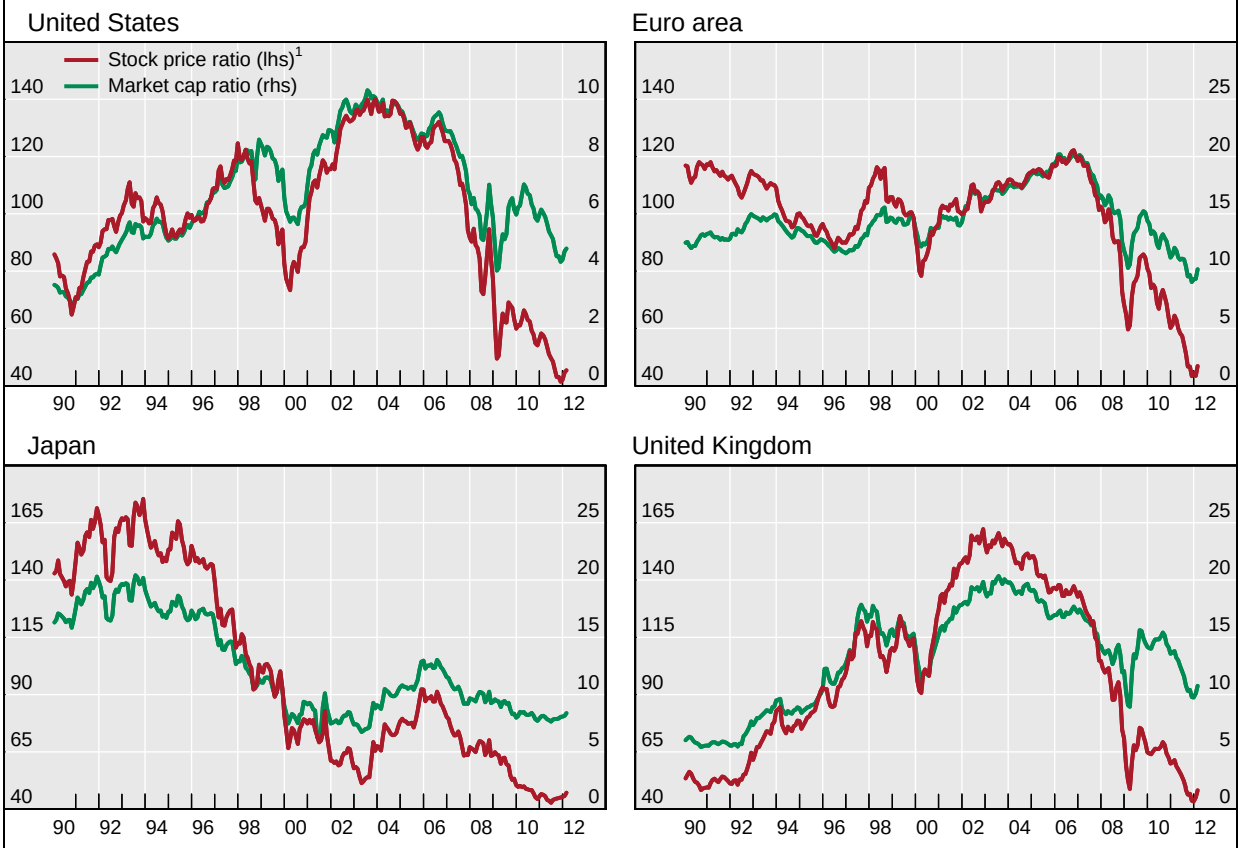
Banks represent a sizeable share of the broad market portfolio in developed equity markets. In the United States and the United Kingdom, this share grew substantially over the past two decades in line with the increase in financial activity. For example, at the end of 2011 banks made up around 5% and 10% of the overall market capitalisation, respectively, of the S&P 500 and FTSE 100 indices. This was roughly double their share at the beginning of the 1990s, albeit only half that on the eve of the crisis. The market capitalisation shares in continental Europe and Asia are currently about 8% and 10%, respectively, in both cases below their levels in 1990.

While the banking sector index depicts the general trend in bank equity prices, it is silent about the drivers of their performance. Understanding these drivers is important for equity market investors, bank managers and prudential regulators alike. For investors, a better understanding would inform portfolio decisions. For bank managers, the expected rate of return on shareholders' funds represents a key hurdle rate for business decisions. For policymakers, it would shed light on the incentives of bank shareholders and, by extension, bank managers. Furthermore, insight into the determinants of bank equity prices can also inform the calibration of policies to shape incentives for banks to build up loss-absorbing buffers in the most efficient way.

… can be explained by a three-factor model …

We use a standard asset pricing framework to examine the drivers of bank stock returns. The workhorse for our analysis is the factor pricing model that describes the cross section of equity returns and is used extensively in the empirical finance literature. The model describes the returns of an individual

Banking equity performance relative to broad indices



[1] Whole period = 100.

Sources: Datastream; BIS calculations.

Graph 1

stock in terms of its sensitivity (often referred to as "beta" or "loading") to a number of pricing factors that are themselves expressed as returns on specific stock portfolios (see box on page 48). One factor corresponds to the market portfolio (typically proxied by a broad-based index) as postulated by the Capital Asset Pricing Model (CAPM) (Sharpe (1964) and Lintner (1965)). Eugene Fama and Kenneth French identify the other two factors as *size* and *value*. The size factor is the difference in the return of a portfolio of small capitalisation stocks and another portfolio of large capitalisation stocks. It has been observed that smaller capitalisation stocks tend to have higher average returns, presumably as a result of higher growth opportunities. The value factor is defined as the difference in returns on the stocks of firms with high and low ratios of book-to-market values. Typically, firms with low book-to-market ratios tend to have consistently higher earnings and higher stock market returns than firms with high ratios.

... that distinguishes between systematic and idiosyncratic risk

The loading of individual stock returns on these three factors determines the systematic component of their risk. In other words, it represents the variability of the stock that is common with other stocks in the market and thus cannot be diversified away. As a result, this component of risk is priced in the market, in the sense that investors require a higher average return in order to hold stocks with higher systematic risk. The part of the variability of the stock that is not captured by its relationship with the three factors is the idiosyncratic

Modelling framework

The three-risk-factor pricing model is well established in the finance literature, as it has been found to explain a large fraction of the systematic movement of the equity returns of individual firms. The model combines the Capital Asset Pricing Model (CAPM) with two additional pricing factors identified by Fama and French (1992) to explain the cross-sectional and time variation of equity returns in excess of the risk-free rate. More concretely, the typical specification of the model is of the form:

$$R_t^i = \alpha + \beta_M \cdot R_{it}^{\ m} + \beta_{HML} \cdot HML_{it} + \beta_{SMB} \cdot SMB_{it} + u_{it}$$

The market factor (R_{it}^m) is the return on the broad market index corresponding to the individual bank. The *value* factor (*HML*) is the difference in the stock returns between a portfolio of firms with a high ratio of book-to-market valuation of their equity and one with a low valuation ratio. The *size* factor (*SMB*) is identified as the return differences between small and large capitalisation stocks.

We augment this framework by including the business cycle, leverage, earnings and book-to-market ratio as characteristics that influence individual banks' return sensitivities to the three pricing factors. Doing so, we assume that the Fama-French three-factor model is correctly specified and that it captures the dimensions of systematic risk, but it does not fully explain the variability of loadings across stocks. We therefore run regressions where, in turn, each of the four additional drivers are entered as interaction terms that essentially shift the loading of a stock on the three factors. For instance, in the case of leverage, we run the regression:

$$R_t^i = \alpha + \left(\beta_M + \beta_{LEV\_MKT} \cdot LEV_{it}\right) \cdot R_{it}^{\ m} + \left(\beta_{HML} + \beta_{LEV\_HML} \cdot LEV_{it}\right) \cdot HML_{it} + \left(\beta_{SMB} + \beta_{LEV\_SMB} \cdot LEV_{it}\right) \cdot SMB_{it} + \eta_{it}$$

We also estimate a parsimonious model (results reported in the last column of Table 1) with the following specification:

$$R_t^i = \alpha + \left(\beta_M + \beta_{LEV\_MKT} LEV_t^i + \beta_{Earning\_MKT} \cdot Earning_t^i\right) \cdot R_t^m + \beta_{HML} HML_t^i + \left(\beta_{SMB} + \beta_{CYL\_MKT} CYL_t^i\right) \cdot SMB_{it} + \varepsilon_t$$

where *LEV* is leverage defined as total assets over the market value of equity; *Earning* is net income over equity; and *BTM* is the book-to-market value of equity. *CYL* is the business cycle defined as the GDP growth deviation from a time trend. This variable is normalised to take discrete values of 1–4 on the basis of the quartile of its distribution over time.

The data used in this article cover the annual returns on the stocks of 50 actively traded global banks located in 11 OECD countries (Australia, Austria, Canada, France, Germany, Japan, the Netherlands, Spain, Switzerland, the United Kingdom and the United States) for the period 1990–2009. Banks are included in the sample until their stock is no longer traded. When two banks merge, only the surviving entity stays in the sample.

We complement the return data with information about banks' consolidated balance sheets and income statements, and country-specific macro data. For market indices, we take the national stock market index for each country. More specifically, we use the S&P 500 (United States), FTSE 100 (United Kingdom), TSX (Canada), CAC 40 (France), DAX (Germany) and Nikkei (Japan). The Fama-French factors are taken from Kenneth French's website. The value factor is available for each country, while the size factor is available only at the global level.

risk of the firm's equity. Since this risk can be diversified away in large portfolios, it is not priced in the market and does not command a higher return.

The general framework is used extensively in the literature to explain the movement of stock returns both over time and in the cross section. For example, Campbell et al (2001) use it to measure the level of idiosyncratic risk

over time. Fama and French (2004) provide a summary of the related literature. More recently, Da et al (2012) conclude that the framework does a good job in providing estimates of the cost of capital for non-financial firms. Fewer studies have focused on bank stocks. This is partly because bank equity prices are likely to be influenced by regulation and the safety net. That said, Schuermann and Stiroh (2006) have found that the three factors account for the lion's share of the systematic risk in individual bank stocks. Stiroh (2005) investigated whether additional factors, such as different interest rate spreads, can explain bank-level equity returns, but he did not find strong evidence supporting that fact. Demsetz and Strahan (1997) drew the conclusion that larger banks are more diversified (ie have a lower share of idiosyncratic risk) than smaller banks, but they are not less risky overall because they operate with more leveraged balance sheets.

The model is augmented with …

We augment the standard framework by including the business cycle and three bank-specific characteristics as additional drivers of the systematic risk in banks' stock prices. In particular, we consider three bank-specific variables: leverage, earnings and book-to-market valuation.

… the business cycle …

Intuitively, the state of the business cycle can influence bank equity prices through its impact on bank assets. During an economic boom, default rates for loans to households and firms decline. This, in turn, boosts bank earnings and can mitigate investors' perception of the risk in bank profits, thereby lowering their required return on bank stocks. Recessions have the opposite impact on loan values and bank earnings, thereby raising required returns. In fact, the impact is arguably asymmetric. The negative influence near the bottom of the cycle is stronger than the positive influence near the top of the cycle, given that credit losses that materialise a in a recession were typically underpriced during the preceding boom. We measure the business cycle as the deviation of GDP growth from its time trend.

… leverage …

Bank balance sheets are highly leveraged. The average ratio of total assets to shareholders' capital is about three for non-financial companies, but it is six times that figure for banking firms.[2] From the shareholders' perspective, higher bank leverage boosts the return on equity for any given level of bank profits. This, however, imposes higher risk, since leverage also increases the volatility of that return. Indeed, in most advanced economies bank equity prices have been more volatile than those of non-financial companies in the last four decades.[3] We measure leverage as the ratio of total assets to the market value of equity (ie market capitalisation).[4]

…book-to-market ratio …

Arguably, financial companies' financial statements are harder to assess than those of other firms, as they are more opaque. The difference between the book and market value of a bank is a proxy for that opaqueness, which can be traced to the predominance of information-intensive, and often complex,

[2] See BIS (2010) for details.

[3] See reference above.

[4] We also used the ratio of total assets to book value of equity as an alternative measure of leverage and obtained very similar results.

financial instruments on banks' balance sheets. Conservative valuation practices, often induced by regulatory decisions, tend to build buffers by setting higher thresholds for the recognition of gains than losses.[5] This, combined with leverage, can possibly increase the wedge between the book and market value of banking firms.

... and earnings history ...

Earnings capacity is a key element in the stock market valuation of firms. Higher sustainable profits should lead to higher dividend payments and boost firms' equity values. We use past earnings as a proxy for future cash flows and hence for payments to shareholders. To the extent that bank managers smooth earnings, they also increase the correlation between reported earnings in consecutive years and augment the salience of this driver.

... each interacting with the risk factors

We postulate that these three drivers affect bank equity performance indirectly. Rather than treating them as independent sources of systematic risk, we assume that they affect bank share prices through their influence on the sensitivity (loadings) of the stock to the three established factors. To formally assess the influence of these characteristics, we include interaction terms between them and the three market pricing factors. The idea is that the coefficients of these interaction terms act as shift parameters, capturing how the sensitivity of returns to systematic risk vary in line with the bank characteristics. The box on page 48 describes in greater detail the specification of the estimation framework and the data used.

We take this approach for empirical reasons. We interpret the large asset pricing literature as suggesting that the Fama-French factor model is a robust specification of the systematic risk in equity returns. It can explain the cross-sectional variations in stock returns quite well. Thus, we do not construe our additional drivers as additional dimensions of systematic risk.[6] Instead, we assume that they help describe the way individual bank stocks relate to these factors by affecting the risk loadings. For example, leverage amplifies risk and return to holders of the bank's equity but does not alter the nature of the risk, which is determined by the business model of the firm. It is thus expected to increase the loading on the risk factors. Similar arguments can be made for the other bank characteristics and the business cycle. This approach accords with findings that factor loadings vary both over time and across stocks. In particular, Fama and French (1997) have demonstrated this result in the US equity market, while Schuermann and Stiroh (2006) and King (2009) have done so for bank stocks. We contend that the drivers can help explain this variability in factor loadings.

Determinants of required stock returns for banks

We next discuss the impact of the different drivers on the sensitivity of bank stock returns to the systematic risk factors. Table 1 presents the results of our empirical analysis. Each of the first four columns reports regressions that, in

[5] See Borio and Tsatsaronis (2005) for a discussion of valuation conservatism.

[6] This is consistent with the findings in Schuermann and Stiroh (2006).

addition to the three risk factors, include interaction terms of the factors with a specific driver. The last column of the table reports the results of a parsimonious specification that includes only statistically significant interaction terms. At the end of the section, we consider separately the stock price returns for more systemically important banks (Table 2).

Business cycle and bank returns

Bank returns are procyclical

Bank equity returns are more sensitive to systematic risk near cyclical troughs than they are near the top of the cycle. More specifically, the first column in Table 1 shows the estimates of the interaction terms between the variable depicting the cyclical phases and the three pricing factors. Negative coefficients indicate that bank stocks are more sensitive to the market and size factors in economic downturns. The result is most pronounced in the case of the size factor. The loading on size increases by 15 basis points when GDP growth deteriorates by moving down one quartile.

Another way to gauge the overall effect of the business cycle on average stock returns is to multiply the average value of the two risk factors by the difference between the coefficient on the interaction term between the top and bottom quartiles of the output gap. The average value of the market factor is about 4% and that of the size factor 2%. This implies that the sensitivity of the return on bank stocks can increase by 162 basis points when economic activity moves from peak (top quartile) to trough (bottom quartile). Put in different words, the returns that bank equity investors demand can be higher by 1.62 percentage points in recessions. This is consistent with the stylised fact that firms' equity issuance is procyclical (see Covas and Den Haan (2010) and Choe et al (1993)).

Leverage and bank returns

The regressions confirm the assertion that higher leverage leads to a higher sensitivity to systematic market risk (Table 1, second and fifth columns). If the ratio of a bank's total assets to its equity increases by 10 and the market return is 4% in excess of the risk-free rate, the bank pays 0.4% more for every unit of equity in the form of a higher expected return to investors holding its stock. This is the increase in risk that is priced in the equity market.

Leverage increases the cost of equity

In addition to increasing the required return on bank stocks, leverage also boosts the idiosyncratic risk of the stock. The volatility of the regression residuals captures this component of risk in our model. Banks that are more leveraged tend also to have residuals that have a higher variance. Given that idiosyncratic risk is not priced, the holder of the stock would need to diversify it away in larger portfolios. Given the potential impact on equity investors, it is useful to gauge the relative impact of higher leverage on the systematic and non-systematic risk components. To that effect, we perform a "back of the envelope" exercise in two stages, focusing on the regression reported in the third column of Table 1. In the first stage, we remove the direct impact of all risk factors from the bank returns and all leverage interaction terms. This is achieved by running four regressions on a constant and each of the three

Business cycle, leverage and bank returns

	Business cycle	Leverage	Earnings	BTM	Overall
Market	1.29***	0.88***	1.18***	0.90***	0.98***
	(17.25)	(18.23)	(27.62)	(13.84)	(19.85)
HML	0.23**	0.53***	0.48***	0.49***	0.40***
	(2.56)	(7.62)	(7.96)	(5.97)	(7.04)
SMB	0.48***	0.21**	0.02	0.18	0.47***
	(3.23)	(2.03)	(0.24)	(1.52)	(2.89)
CYL_Market	–0.06**				
	(–1.99)				
CYL_HML	0.05				
	(1.49)				
CYL_SMB	–0.15***				–0.14**
	(–2.62)				(–2.33)
LEV_Market		0.01***			0.01***
		(7.44)			(6.47)
LEV_HML		–0.00			
		(–0.14)			
LEV_SMB		–0.02**			
		(–2.42)			
Earning_Market			–1.08***		–0.90***
			(–5.02)		(–5.54)
Earning_HML			–0.42*		
			(–1.77)		
Earning_SMB			0.66		
			(1.53)		
BTM_Market				0.27***	
				(4.29)	
BTM_HML				–0.04	
				(–0.49)	
BTM_ SMB				0.27**	
				(–1.97)	
Constant	1.61**	2.23***	1.92**	2.25***	2.35***
	(2.17)	(2.62)	(2.38)	(2.74)	(2.96)
Number of observations	1,176	689	790	794	790
R^2	0.56	0.64	0.62	0.61	0.64

The dependent variable is the excess return on bank equity. Market, HML and SMB are the market, value and size factors, respectively. The other explanatory variables are interaction terms between the business cycle (CYL) and the three factors, between market leverage (LEV) and the three factors, between earning yields (Earning) and the three factors, and finally between the book-to-market ratio (BTM) and the three factors. The models are estimated as pooled ordinary least squares (OLS). Numbers in parentheses show *t*-statistics. *, ** and *** indicate significant level of 10%, 5% and 1%, respectively.

Source: Authors' calculations. Table 1

systematic factors. The dependent variables in these regressions are the stock returns and the three leverage interaction terms. In the second stage, we assess the effect of leverage on returns conditional on the three risk factors by regressing the residuals of the first of these regressions (the one that corresponds to the stock returns) on the residuals of the other three

regressions (the ones that correspond to the three systematic factors). The goodness-of-fit of this second-stage regression measures the proportion of the variability in stock returns explained by leverage, net of the direct influence of the three factors. This is the contribution of leverage to systematic risk. Its complement – that is, the unexplained proportion of return variability – is a measure of the impact of leverage on the risk of the stock that is not priced in the market. Our estimate for the goodness-of-fit of this second-stage regression is 12%. This suggests that only about one eighth of the overall increase in the volatility of equity returns due to higher leverage is priced. The remaining increase represents risk that is idiosyncratic, which does not command higher returns and which can only be diversified in large portfolios.

How would deleveraging affect a bank's weighted average cost of funds? Our results suggest that if leverage declines, the cost of equity will also fall. For example, if leverage of the average bank halves to 10, the market beta would fall by 10 basis points. This implies that the average equity factor for banks will fall by 0.4% to 13.0%. Assuming a 5% cost of debt, the weighted average cost of funds for the bank would be 5.8% (ie 0.10*13.0% + 0.90*5%).[7] This is only about 40 basis points higher than when leverage is equal to 20, the average value in our sample. Critically, this calculation ignores any beneficial effects on the costs of bank debt from the fact that lower leverage lowers the risk of default. Any such effect would tend to make this reduce the estimated increase in the cost of capital. These results are in line with the very small impact on the cost of funding associated with large increases in bank capital estimated by Kashyap et al (2010) for US banks and Miles et al (forthcoming) for UK banks.

Book-to-market value and banks' returns

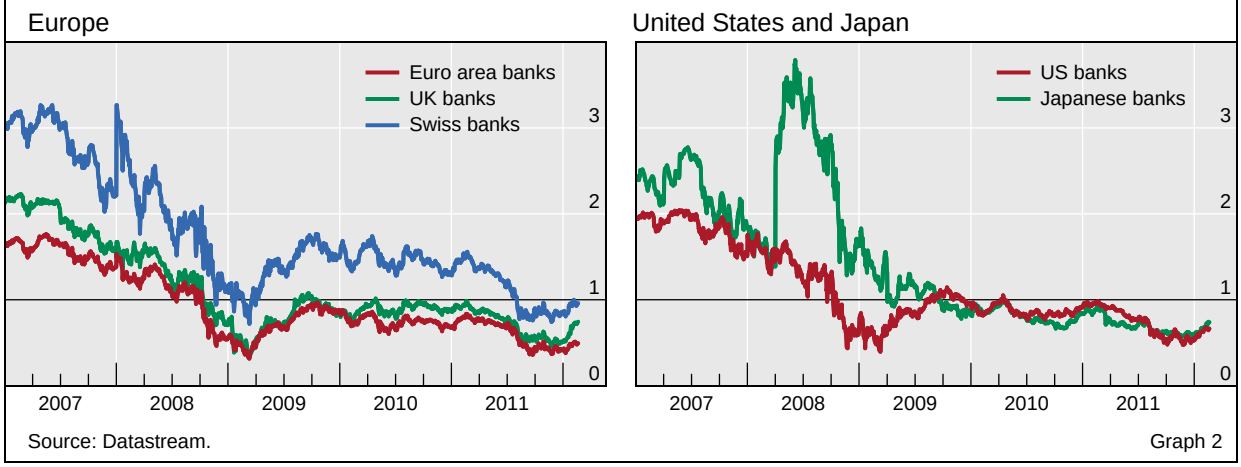
What is the role of market valuation in bank stock returns? The ratio of book value to market value of equity (BTM) is often used as an indicator for firms' future earnings capacity. Put another way, if investors have a favourable view of a firm's future earnings, they will push up the price of its stock, thus lowering its cost of equity and creating incentives for managers to undertake additional investment. By contrast, financial stress would coincide with rising BTM ratios. From 2008, the BTM ratio rose around 50% for most banks in the sample (Graph 2). The increases were particularly pronounced for German, Austrian and Dutch banks. In sharp contrast, the recent crisis has hardly affected the BTM ratios of banks in Australia, Canada and Japan.

Opacity increases risk sensitivity

We find that banks with a high BTM also have a higher loading on systematic risk and hence a higher cost of equity (Table 1, third column). Higher systematic risk means that these banks need to sell more shares in order to raise a given amount of equity, thus imposing a greater dilution on the value of holdings of existing shareholders. This will also have detrimental effects on the return on equity and management compensation that are often tied to this metric of performance. Thus, high book-to-market value could discourage bank shareholders and managers from raising fresh capital.

[7] The calculation is based on the assumption that the market, size and value factor are at their sample averages of 4%, 1.9% and 4%, respectively.

Bank price-to-book ratios



Source: Datastream.

Graph 2

Profitability and bank returns

Cost of equity declines with profitability

Empirical research has found that highly profitable firms face a lower cost of equity funding (for example, Hail and Leuz (2006)). This work has not looked at banks. In the third column of Table 1, we use earnings (defined as net income over equity) to proxy for future profitability. We find that high profitability compresses the market beta. In other words, more profitable banks tend to be less correlated with the market return, facing therefore a lower risk premium. This could reflect the extra buffer that higher profits afford to banks that would like to preserve stable cash distributions to shareholders through earnings and dividend smoothing.

Using our estimates in the parsimonious model, we calculate the cost of equity for banks. Graph 3 shows how this cost varies over time and across countries. We find that banks in the United Kingdom have the lowest estimated cost of equity (about 5.5% on average), followed by their Japanese peers. In contrast, banks in Germany are confronted with a high average cost of equity, nearly 15%. US and Canadian banks face a more moderate cost of equity, of around 7.5%.

What factors account for the cross-country differences in the cost of equity? It is tempting to attribute these differences to country-specific characteristics, but we do not find evidence to support this hypothesis. Controlling for country effects, we do not find them to be statistically significant. This suggests that differences in the factors account for most of the variations. For example, the elevated cost of equity for German banks can be mainly attributed to an average ratio of assets to equity of around 40, twice the sample average. Similarly, below-average earnings also contributed to high required returns for these banks. In the case of the United Kingdom, low costs of equity are linked to very low values of the market factor (below 1%) and the value factor.

Systemic importance of banks and the cost of equity

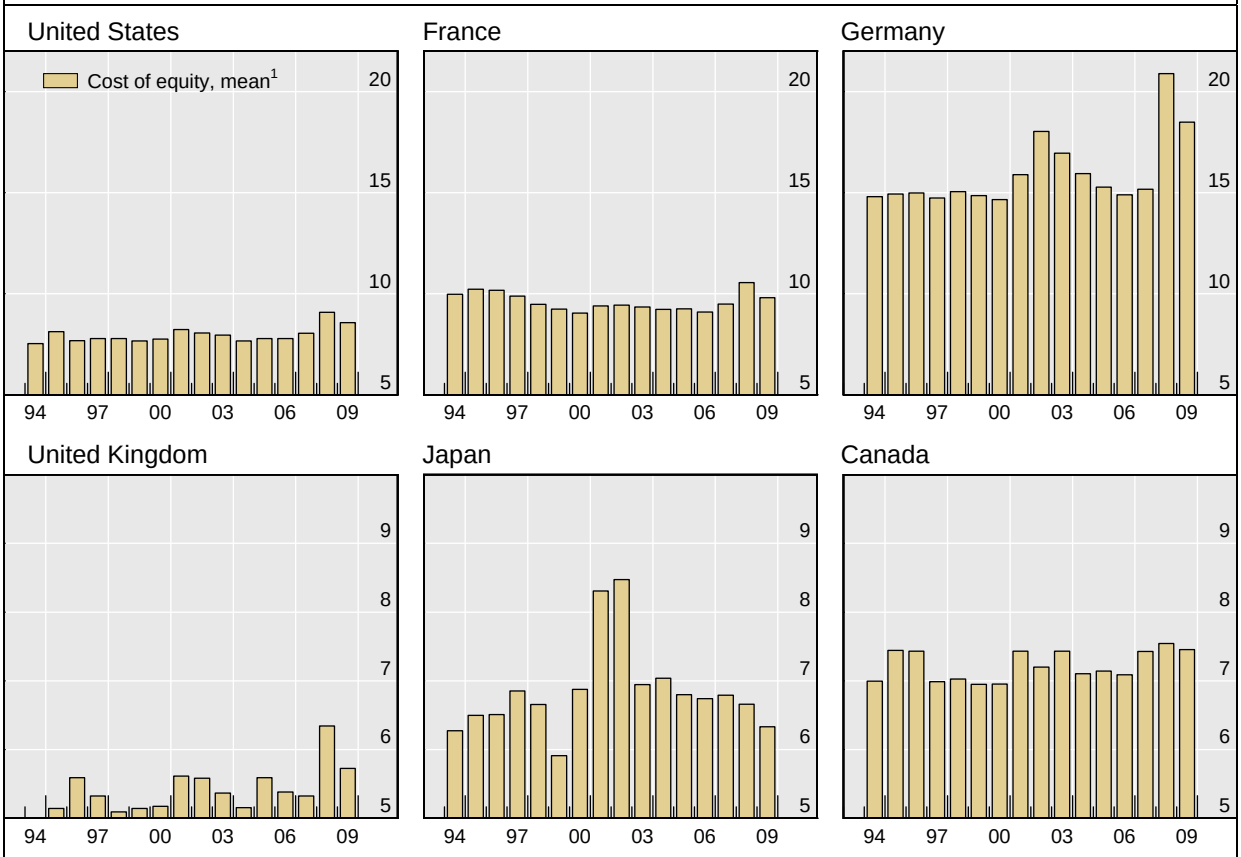
The presence of the financial safety net can affect the behaviour of bank stock prices. Explicit provisions such as deposit insurance and the access to liquidity facilities by the central bank, as well as the perceived availability of state support in times of distress, can affect market discipline by numbing creditors' sensitivity to risk-taking by banks. Besides lowering the cost of debt financing, this also means that shareholders of banks that are more likely to receive support may require a lower return on their investment, in line with the reduced risk of the bank failing.

Systemically important banks have a lower cost of equity

In order to assess the impact on the sensitivity of stock market returns for these banks, we focus explicitly on banks that were included in the list of global significantly important institutions published by the Financial Stability Board. Our dataset covers 22 banks among the 29 included in this list of global systemically important banks (G-SIBs). The average G-SIB has total assets of $986 billion, leverage of 26 and a book-to-market ratio just above unity. For comparison, the other banks in the sample are smaller, with total assets of

Required return on equity and business cycles (inflation-adjusted)

In per cent



[1] Annual estimates of the cost of equity for each country's banking sector are calculated by averaging all values for the banks headquartered in that country on an equally weighted basis. For each bank, the cost of equity figures represent the estimated required equity market return for the bank in excess of the risk-free interest rate. The bank-specific cost of equity is equal to a sum of estimated betas (market, value and size beta) multiplied by the average factor returns. The figures are expressed in real terms by subtracting inflation expectations which are taken from consensus forecasts.

Source: Authors' estimates. Graph 3

Required return on equity: G-SIBs vs other banks		
	G-SIBs	Other banks
Market	1.01***	0.99***
	(9.66)	(13.75)
HML	0.39***	0.41***
	(3.61)	(6.17)
SMB	0.54	0.29
	(1.42)	(1.64)
CYL_SMB	–0.04	–0.18***
	(–0.29)	(–2.71)
LEV_Market	0.01***	0.01**
	(6.55)	(2.46)
Earning_Market	–0.93***	–1.04***
	(–4.14)	(–4.21)
Constant	0.92	2.82***
	(0.57)	(3.09)
Number of observations	224	559
R^2	0.72	0.61

The dependent variable is the excess return on bank equity. Market, HML and SMB are the market, value and size factors, respectively. The other explanatory variables are interaction terms between the business cycle (CYL) and the three factors, between market leverage (LEV) and the three factors, between earning yields (Earning) and the three factors, and finally between the book-to-market ratio (BTM) and the three factors. The models are estimated as pooled ordinary least squares (OLS). Numbers in parentheses show *t*-statistics. *, ** and *** indicate significant level of 10%, 5% and 1%, respectively.

Source: Authors' calculations. Table 2

$250 billion on average, less leveraged, with leverage of 20, and a book price around 75% of the market price for equity.

In Table 2, we report the results of the parsimonious regression specification, splitting the sample between the G-SIBs and the rest. We find that both market and value factors are significant drivers of average stock returns for G-SIBs. We also find that leverage amplifies the impact of the market factor to a similar degree for both groups of banks. In addition, high profitability reduces the correlation between bank shares and the market factor, but this effect is slightly more pronounced for less systemically important banks. Interestingly, G-SIBs' returns do not exhibit any clear cyclical pattern. This could reflect big banks' real, or perceived, ability to smooth the effect of the cycle on earnings or to diversify away risk across business lines and countries. On the basis of these estimates, equity investors in G-SIBs require on average about a 6% return compared with about 8% for the other banks with a similar leverage or BTM ratio.

Conclusion

The results of our analysis provide support for the regulatory reform embodied in the most recent revision of the Basel prudential framework for banks. In particular, they suggest that higher capital requirements can be beneficial to

equity investors by restraining bank leverage, and provide an additional rationale for the introduction of countercyclical capital buffers.

Our analysis shows that it is cheaper for banks to raise capital during an economic expansion than in a recession. The low hurdle rate for investment in a boom can have a procyclical effect. It encourages credit growth that can further boost economic activity. From a prudential viewpoint, this evidence supports the rationale behind the introduction of countercyclical capital buffer requirements, which increase in booms and decline in busts. This would provide a concrete incentive for banks to build buffers when equity is relatively cheap, rather than having to do so after capital is depleted and the cost of balance sheet repair is higher.

One of our findings is that even though the equity market rewards leverage with higher returns, balance sheet gearing also comes with higher stock price volatility. In fact, most of the increased volatility in bank stock returns associated with higher leverage is not priced in the market. This means that stricter capital rules not only reduce leverage and lower the required return in the stock market, but also reduce non-remunerated volatility for the holders of bank equity, making diversification easier. Moreover, the fact that lower leverage goes hand in hand with lower required returns downplays industry concerns that higher capital requirements will imply a material increase in funding costs. The finding that G-SIBs enjoy a lower cost of capital compared with other banks with similar characteristics supports the motivation behind the requirement for capital surcharges decided by the international policy community.

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