BANK FOR INTERNATIONAL SETTLEMENTS

What are capital markets telling us about the banking sector?

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1. Introduction

It is a pleasure to be back at the IESE Business School and to join such distinguished panellists for this conference.

Today, I would like to offer some reflections on the challenges facing the banking sector and their relationship with regulatory reforms.

As we all know, in response to the Great Financial Crisis of 2008–09, regulators pursued ambitious financial reforms to make the financial system more resilient to systemic risks. A key element is a significant increase in the quantity and quality of regulatory capital. While Basel III is still being completed – full implementation is scheduled for 2019 – these more stringent regulatory standards have already improved banks' capital structure. For example, for the major banks monitored by the Basel Committee, CET1 capital ratios (CET1/RWA) increased, on average and on a fully loaded basis, from about 7% in 2011 to 11.8% at end-2015.[1] During the same period, leverage ratios rose from about 3.5% to 5.6% on average. Let me remind you that the minimum capital for CET1 is 4.5% and that the target capital (minimum plus the conservation buffer) is 7%; actual capital ratios for most banks significantly exceed these requirements.

These moves to more and better capital are a response not only to regulation but also to market pressure, as the crisis experience has also sharpened the risk perception of banks, bank creditors and equity market investors. Those creditors and investors now sanction banks that are undercapitalised, not profitable or not creditworthy.

Despite this progress in increasing banks' loss absorption capacity, the path to recover trust remains difficult. The best example is the puzzling and protracted scepticism of bank equity investors. For many banks, especially in Europe, price-to-book ratios have been under pressure and remain close to the troughs that were observed in the aftermath of the Great Financial Crisis.

There is no shortage of accounts offered for these challenges, ranging from modest growth to persistently low interest rates, unresolved asset quality problems, the presence of new fintech competitors, and tighter regulation. To be sure, efforts to reduce leverage also tend to lower return on equity. How much weight should we place on each of these factors in assessing the challenges facing the banking sector?

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[1] Basel Committee on Banking Supervision, *Basel III Monitoring Report*, September 2016.

My perspective today is from the capital markets. If we think of capital markets as a mirror, what are the reflections telling us about the current state of the banking sector? I believe they are quite revealing, especially about the pressures faced by banks as borrowers, and these pressures are contributing to the downward trend seen in bank leverage.

This capital markets perspective and some BIS analysis support the notion that, even if regulation is a factor in the way that banks approach their business, it is not the only factor, nor perhaps the most important one.

Before I get into the discussion, let me clarify where we stand with the capital regulation. Typically, there are two concerns: the first is that regulation is excessive and that it is constraining lending capacity; and the second is the uncertainty associated with completing the reforms and the final calibration. The Basel Committee is working to finalise the Basel III regulatory framework by the end of this year, thereby dissipating regulatory uncertainty. And both the Basel Committee and the Governors and Heads of Supervision reaffirmed that there should not be a significant increase in the overall capital requirements.

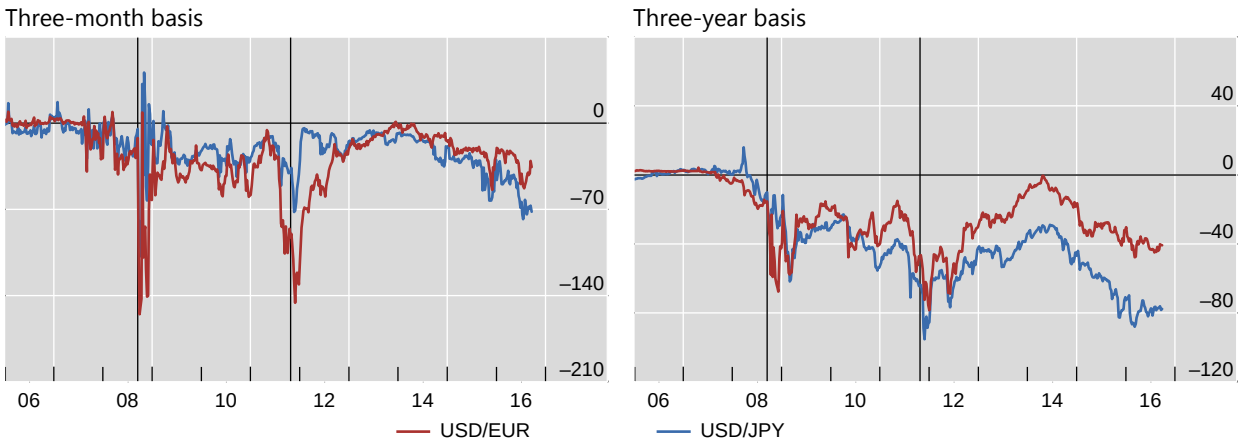
2. A revealing market anomaly

Even as stock markets were hitting all-time highs in the past few years, not all the signals were pointing in the same direction. In contrast to the overall stock index, the banking sub-indices in advanced economies, especially those other than the United States, were subdued. The market-to-book ratios of European and Japanese banks are well below one, and for some banks below 0.5.

More intriguingly, signs of investor exuberance in the stock market appeared side by side with market anomalies which, in the past, have been associated with stress in financial markets. A notable example is the breakdown of covered interest parity (CIP) – one of the best established laws in international finance.

Cross-currency basis against the US dollar

In basis points — Graph 1



The vertical lines indicate 15 September 2008 (Lehman Brothers file for Chapter 11 bankruptcy protection) and 26 October 2011 (euro area authorities agree on debt relief for Greece, leveraging of the European Financial Stability Facility and the recapitalisation of banks).

Source: C Borio, R McCauley, P McGuire and V Sushko, "Covered interest parity lost: understanding the cross-currency basis", *BIS Quarterly Review*, September 2016, pp 45–64.

CIP states that the interest differential between two currencies in the cash money markets should equal the differential between the forward and the spot rate. This relationship broke down for the US dollar during the Great Financial Crisis. Since mid-2014, the gap between these two measures has widened again, though in a different manner than during the crisis (Graph 1). Market players who borrow dollars in FX markets by pledging yen or euros pay more than they would borrowing in the dollar money market. The violation of CIP offers a window on some aspects of the current state of the banking sector and the underlying currents in global capital markets.

Two questions: Why has the gap opened up and widened again? And more importantly, why does the gap not disappear through arbitrage?

On why the gap has widened since mid-2014, the evidence suggests that search for yield and the divergence of monetary policy across the major advanced economies have played key roles. Banks, pension funds and life insurance companies in economies with low or negative rates have sought to pick up yield by purchasing dollar assets. This "flight from zero" has compressed US yields, while the institutional investors' attempts to hedge the resulting foreign exchange risk have pushed the basis wider. Demand for hedging may also come from corporations, a good example being the increase of so-called reverse yankee issuance in the euro. US firms have been issuing in euros and then swapping the proceeds into dollar obligations. As banks are in the frontline providing such hedging services, their capacity to bear the hedging demand is a critical determinant of the size of the deviation from CIP. Recent BIS work has highlighted the mechanisms involved, and I will not dwell on those details today.[2]

More puzzling is why this gap has not closed in the usual way through arbitrage. The textbook argument is that if the gap persists, someone could borrow at the low interest rate and lend out at the higher interest rate with currency risk fully hedged at maturity, thereby making potentially unlimited profit. In textbooks, anyone can engage in such trades in competitive markets at prevailing market prices. In practice, however, such arbitrage typically entails borrowing and lending through banks, and is never truly risk-free in the way textbooks assume. Since hedge funds or other unregulated entities also rely on dealer banks to put on leveraged trades, banks remain the focus of attention. If the gap persists, it is because banks do not or cannot exploit such opportunities, and do not have sufficient capacity to lend to non-bank financial institutions to allow these non-banks to close the gap either.

Since bank capital is one of the constraints that can limit the exposures borne by a bank, the persistence of the gap might suggest that banks do not have enough capital to take on such transactions, or at least are putting such a high price on the use of their balance sheet as to make the trade uneconomical at these spreads. A simple calculation goes like this: Suppose that the cost of equity is 10% and leverage regulation restricts the leverage ratio of the bank (as measured by the ratio of equity to total assets) to be at least 4%. Then, a back-of-the envelope calculation of the cost of equity resulting from expanding the balance sheet is 10% times 4%, or 40 basis points. For simplicity, I neglect other costs. So, if we believe this calculation, the existence of financial regulation means that the cross-currency basis must be at least 40 basis points before the bank can cover the cost of equity.

However, this cost of equity calculation is not enough to fully explain the puzzle. First, the recent deviations from CIP have been large enough for banks to cover the cost of equity and engage in arbitrage trades.[3] Second, although some banks may be constrained by capital regulation, many others

[2] See H S Shin, "The bank/capital markets nexus goes global", speech at the London School of Economics, London, 15 November 2016, and C Borio, R McCauley, P McGuire and V Sushko, "The failure of covered interest parity: FX hedging demand and costly balance sheets", *BIS Working Papers*, no 590, October 2016.

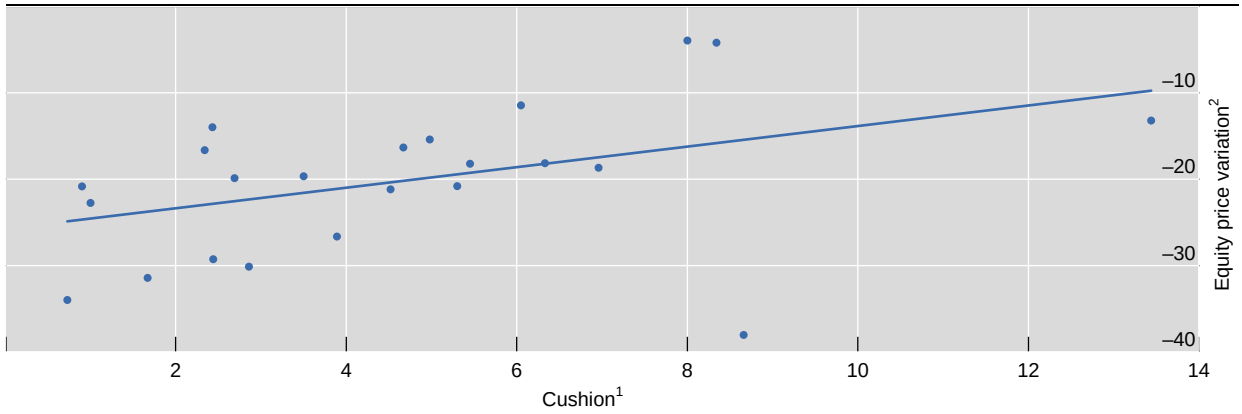
[3] Deviations from CIP have been reaching up to 100 basis points, which the cost of bank equity alone cannot account for. See W Du, A Tepper and A Verdelhan, "Deviations from covered interest rate parity", *SSRN Working Paper*, September 2016.

are well capitalised, with capital levels comfortably exceeding any regulatory requirements. The fact that the gap persists in spite of such well capitalised banks suggests that regulation cannot be the whole story as to why banks are not engaged in these types of trades. Regulation may be one factor, if it interacts with other internal economic capital cost calculations, but it is arguably not the only one.

This cushion of capital that banks feel they need to hold above the minimum Basel III requirements is significant, close to 5% points (11.8% minus 7% target) and may be driven by market requirements, for instance by the desire to keep rating downgrades or future supervisory constraints, including stress test results, at a safe distance. For example, in the US context, the annual Comprehensive Capital Analysis and Review (CCAR) – commonly referred to as the Federal Reserve "stress test" – raises the bar for capital to cope with stress situations, and injects some uncertainty into the assessment of capital adequacy. As a result, US banks hold a buffer on top of the regulatory minimum. In this sense, the stress test achieves the objective of inducing banks to be better capitalised for stress situations. Banks probably also factor in that, post-crisis, equity investors have become more prompt and brutal in sanctioning undercapitalised banks. One recent example is the turbulence in the market for European bank stocks earlier this year. That episode followed uncertainties regarding tighter dividend distribution restrictions. As you can see from Graph 2, banks with the thinnest capital cushions experienced the most severe drop in their equity price.

Individual banks' stock price variations and cushion

In per cent — Graph 2



[1] Defined as the difference between the Common Equity Tier 1 (CET1) ratio and the Supervisory Review and Evaluation Process (SREP) ratio at 31 December 2015. [2] Defined as the growth rate of banks' equity price between 4 January 2016 and 15 February 2016.

Sources: Bloomberg; CreditSights; Datastream; BIS calculations.

The deviations from CIP in spite of the fact that many banks globally have ample regulatory capital suggest that banks may be acting more conservatively than would be implied by minimum capital requirements alone. To express this in another way, the high internal price on balance sheet usage in banks' capital allocation decisions may reflect factors other than regulatory capital.

In a speech at the LSE earlier this week, my colleague Hyun Shin made the point that, since 2009, new factors have emerged as the drivers of banks' balance sheet capacity. For example, the VIX index – an indicator of market volatility – is no longer a good barometer of bank leverage.[4] One new

[4] Shin (2016), op cit.

driver is the dollar. This reflects the notion that, in a world where banks have significant liabilities denominated in dollars, an appreciation of the dollar is likely to constrain banks' funding.

The constraints imposed by creditors in the wholesale funding markets shape banks' capital allocation decisions. Banks' willingness to expand their balance sheets and to take on exposures in the capital market reflects the funding cost of taking on such exposures. The signals emanating from the treasury of the bank – its securing of funding from the capital market – sets the tone for how much risk the bank takes on. Adequate pricing of liquidity services is an intended consequence of the post-crisis regulatory reforms, as the risks associated with those services were significantly mispriced before the crisis.

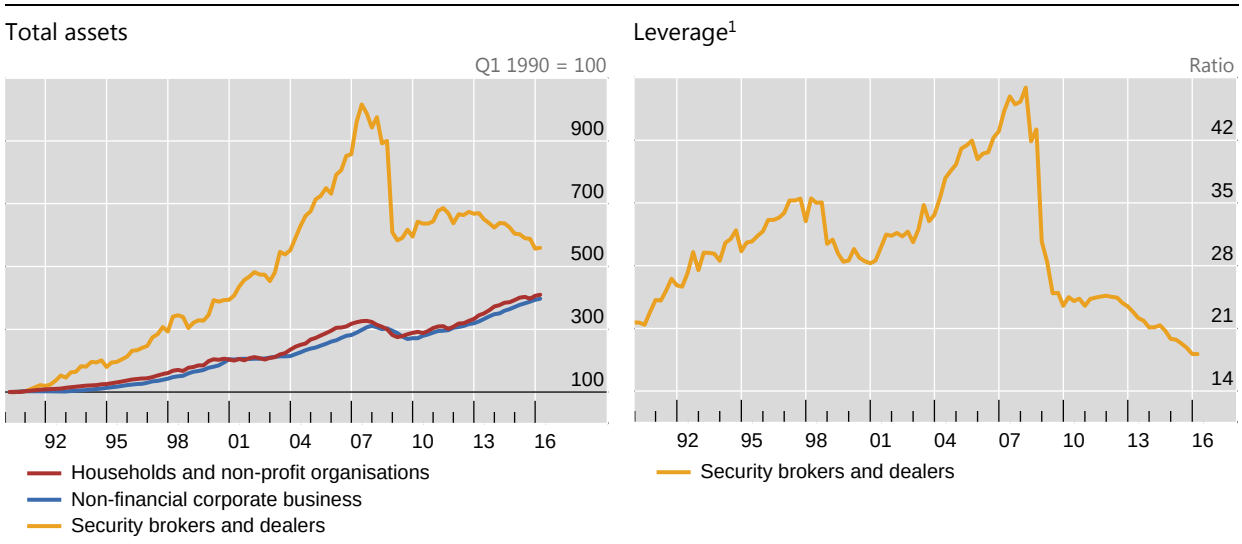
3. Market liquidity and lessons from the "Great Deleveraging" of 2008

The breakdown of CIP is only one symptom of limits to arbitrage and market illiquidity. Another symptom often put forward by market participants is the recent reduction in the size of repo and fixed income market liquidity.

Considering the much larger size of fixed income markets following the boom of new issuance since the crisis, this reduction may simply reflect a return to normal. But there is evidence that buyers and sellers are trading in smaller lots. There is also evidence that dealers have become more reluctant to take large exposures onto their own balance sheets. Dealers play an important role as market-makers in fixed income markets.

We can learn much about the current environment of a higher internal price of the banking sector's balance sheet usage by recalling the boom and bust in bank leverage associated with the Great Financial Crisis. Graph 3 plots total assets and leverage of US securities broker-dealers from 1990 to date. The left-hand panel shows the total assets of the broker-dealers, scaled to 100 at the start of the period. It also includes the total assets of US non-financial firms and US households for comparison. The right-hand panel shows the leverage of US broker-dealers, where leverage is defined as the ratio of total assets to equity.

Total assets and leverage of the US securities broker-dealer sector — Graph 3



[1] Total assets divided by total equity.

Sources: Federal Reserve, *Flow of Funds*; BIS calculations.

By any standard, these charts for US broker-dealers are dramatic. In the left-hand panel, we see that the sector's total assets grew much faster than the rest of the economy. The lack of any heed for market liquidity or counterparty risk drove the rapid asset growth. At the peak of the credit boom in June 2007, these assets had grown more than tenfold from 1990, while those of non-financial firms and households had grown by a factor of three. With the onset of the crisis, risks became evident and balance sheets shrank rapidly. Market liquidity based on weak foundations proved to be unreliable.

These large fluctuations in total assets are mirrored by the fluctuations in leverage, as shown in the right-hand panel. Leverage started out at 22 in 1990 and rose to 48 at the peak, only to collapse with the onset of the crisis in 2008, well before any new regulation was announced. Leverage rebounded somewhat as the crisis abated. However, the most recent period has seen a further decline in the leverage of the broker-dealer sector. At the end of March 2016, it stood at 18, lower than at the beginning of 1990. This decline in leverage reflects, in part, the diminished role of securitisation and the role of the shadow banking system in the post-crisis financial landscape, but it also serves to highlight how much more reticent the banking sector has become in taking on risks.

Why have there been such large fluctuations in leverage? The "Great Deleveraging" of 2008 is clearly an extreme example, during a time of heightened financial stress. Nevertheless, the episode holds lessons for today, by shining a light on the determinants of the risk-taking capacity of the banking sector. The deleveraging in 2008 took place before the introduction of new regulation, suggesting that constraints other than regulatory ones were binding at the time. Understanding these additional constraints in turn sheds light on what is happening to the banking sector in 2016.

In general, leverage is influenced by the combination of the perceived creditworthiness of the borrower and the overall tightness of credit in the financial system. If the system as a whole offers ample funding liquidity, even thinly capitalised banks can borrow on easy terms. Since banks borrow in order to lend, easy borrowing conditions translate into easy lending conditions, reinforcing the already easy financial conditions. By the nature of the interactions between liquidity conditions and leverage, the boom phase traces an apparent virtuous circle of greater leverage and easier liquidity. But this virtuous circle is only apparent, not real. Reality returns when the easy conditions go into reverse, and the amplification mechanism traces a downward spiral.

One of the mechanisms is the haircuts in securities financing that may limit the implicit maximum leverage achievable by a broker-dealer in a repurchase agreement (repo). The repo is a collateralised borrowing arrangement. The difference between the market price today of the pledged security and the amount borrowed against it is called the "haircut" on the repo, and it is this haircut that determines the leverage of the broker-dealer. If the haircut is 2%, the borrower can borrow 98 dollars by pledging 100 dollars' worth of securities. Then, to hold 100 dollars' worth of securities, the borrower must come up with only 2 dollars of equity. Thus, if the repo haircut is 2%, the maximum permissible leverage (ratio of assets to equity) is 50. The right-hand panel of Graph 3 suggests that these were the typical haircuts applied to US broker-dealer assets on the eve of the crisis.

However, when borrowers reach such high levels of leverage thanks to such thin haircuts, any slight shock to the financial system that raises the haircut will leave the bank vulnerable to a sudden tightening of financing conditions. Suppose that the haircut rises to (a still modest) 4%. Then, the broker-dealer's maximum leverage halves to 25. Assuming that the equity stays constant, this means cutting down total assets by half. If the broker-dealer has started with a very large balance sheet, the

shedding of exposures will be immense, causing repercussions for those entities that were borrowing from the broker-dealer, setting in motion second- and third-round effects in the financial system.[5]

Raising new equity or cutting assets entails painful adjustments for the bank. Raising new equity is notoriously difficult in distressed market conditions. However, selling assets in a depressed market is not much better. Experience has taught us that, in stress conditions, borrowers tend to adjust leverage through adjustments to the size of the balance sheet, leaving equity unchanged, rather than through increases in equity.

Financial markets will always be subject to external shocks; the task for policymakers is to mitigate the potential systemic risk coming from the endogenous, second-round effects that arise from the deleveraging reactions of the intermediaries themselves. The painful lesson in 2008 was that dealer banks with high leverage not only transmit external shocks, they actually amplify these shocks through the self-reinforcing downward spiral in leverage. We cannot eliminate external shocks, but we can break the downward spiral by having intermediaries that are more resilient.

Coming back to market liquidity, improved resilience and a more conservative pricing of liquidity services are intended consequences of the post-crisis regulatory reforms. When pricing is more conservative, we should expect to see reduced market liquidity. It would be an intended consequence, as it would help reduce liquidity illusion and would send a signal that market liquidity should not be taken for granted. Pre-crisis liquidity is not a good reference point. Placing liquidity provision on firmer foundations requires strengthened balance sheets on the part of financial intermediaries. Having said that, we continue to monitor the unintended consequences to see if at any point the decline in market liquidity is excessive in any segment of the market.

4. Impact of low bank stock prices

What about the relationship between low bank share prices and funding constraints? The stock indices of the banking sector have remained subdued in relative terms. In Europe, price-to-book ratios are still around 0.5, close to the troughs that were in evidence in the aftermath of the Great Financial Crisis. This is all the more striking considering that, between 2007 and 2014, much of banks' cumulative net income was paid out as dividends or spent on share buybacks.[6] So, what *does* explain equity markets' reticence toward banks? And to what extent does this reticence put pressure on banks' funding and balance sheet capacity?

Banks currently face a number of challenges to their business models in addition to regulation: disappointing growth, low interest rates, high levels of non-performing loans, excess capacity, high cost-to-income ratios and the presence of new fintech competitors. Granted, regulation and the remaining regulatory uncertainty may play a role here. But it is only one term in the equation when it comes to leaving the past behind us.

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[5] See J Geanakoplos, "The leverage cycle", in D Acemoğlu, K Rogoff and M Woodford (eds), *NBER Macroeconomic Annual 2009*, vol 24, University of Chicago Press, 2010; T Adrian and H S Shin, "Liquidity and leverage", *Journal of Financial Intermediation*, vol 19, no 3, 2010; G Gorton and A Metrick, "Securitized banking and the run on repo", *Journal of Financial Economics*, vol 104, no 3, 2012; and T Adrian and H S Shin, "Procyclical leverage and value-at-risk", *Review of Financial Studies*, vol 27, no 2, 2014.

[6] See H S Shin, "Bank capital and monetary policy transmission", panel remarks at the ECB and its Watchers XVII conference, Frankfurt, 7 April 2016, www.bis.org/speeches/sp160407.pdf.

Obviously these challenges do not affect all banks in the same way, nor have all banks made the same progress in addressing them. However, the depressed bank stock prices in relation to the relatively more buoyant performance of stock indices highlight the work that remains to be done.

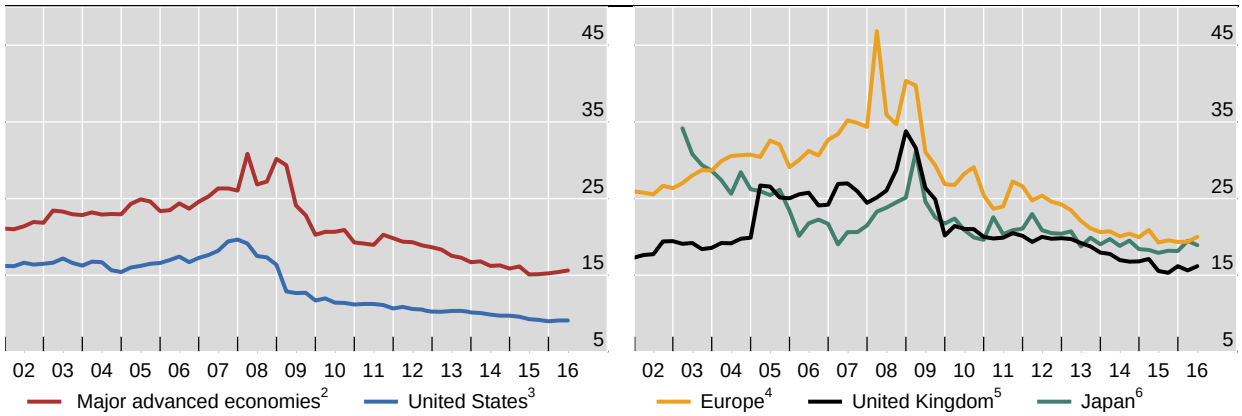
I will not go through the different elements, but let me highlight that stress tests show that non-performing loans (NPLs) are the most important drain on bank capital under the adverse scenario. Despite progress, NPL ratios are in double-digit territory in as many as 10 EU countries.

How does this exert pressure on banks' funding and balance sheets? Banks' funding pressures show up in two ways. The first is through the higher haircuts banks face in collateralised borrowing arrangements in capital markets. The second is through higher spreads on bank liabilities, including convertible debt securities (CoCos) and higher credit default spreads (CDS) on such liabilities.

The focus on CDS and CoCos highlights the importance of creditors to banks. From the bank's point of view, it is the liability side of the balance sheet – the funding operation – where tensions emerge. Whereas higher spreads on bank liabilities affect profitability, the impetus for deleveraging comes from higher haircuts. The "Great Deleveraging" of 2008 was an extreme case of sharply higher haircuts. There continues to be downward pressure on leverage in the banking sector, albeit as a chronic, slow-moving phenomenon rather than the acute phenomenon we saw in 2008.

Graph 4 gives some sense of the decline in the overall leverage of advanced economy banks in general. Leverage is measured as total assets divided by equity, and the red line shows the global average. Leverage was on average around 25 and growing in the years before the crisis, but it has declined steadily since the crisis, reaching around 15 recently. There is considerable variation across the major jurisdictions. US banks have operated with lower leverage than the global average, while banks in Japan and the euro area have maintained higher than average leverage.

Bank balance sheet leverage[1] Graph 4



[1] Total assets divided by total equity, weighted by asset size. [2] For all the banks shown in this graph. [3] Bank of America, Citigroup, Goldman Sachs, JPMorgan Chase, Lehman Brothers (up to Q2 2008), Merrill Lynch & Co, Morgan Stanley, Wachovia Corporation (up to Q2 2008) and Wells Fargo & Company. [4] Banco Santander, BNP Paribas, Commerzbank, Credit Suisse, Deutsche Bank, UBS and UniCredit. [5] Barclays, HSBC, Lloyds TSB Group and Royal Bank of Scotland. [6] Mitsubishi UFJ Financial Group, Mizuho Financial Group and Sumitomo Mitsui Financial Group.

Sources: Capital IQ; BIS calculations.

The downward pressure on bank leverage revealed in Graph 4 reflects, in part, the introduction of post-crisis regulation. But again, regulation alone is not the full explanation.

To understand what other factors may be at play, it is useful to distinguish between book leverage and market value leverage. Central banks and regulators have focused on book values, and regulations are written in terms of book values. Market participants, however, focus also on market

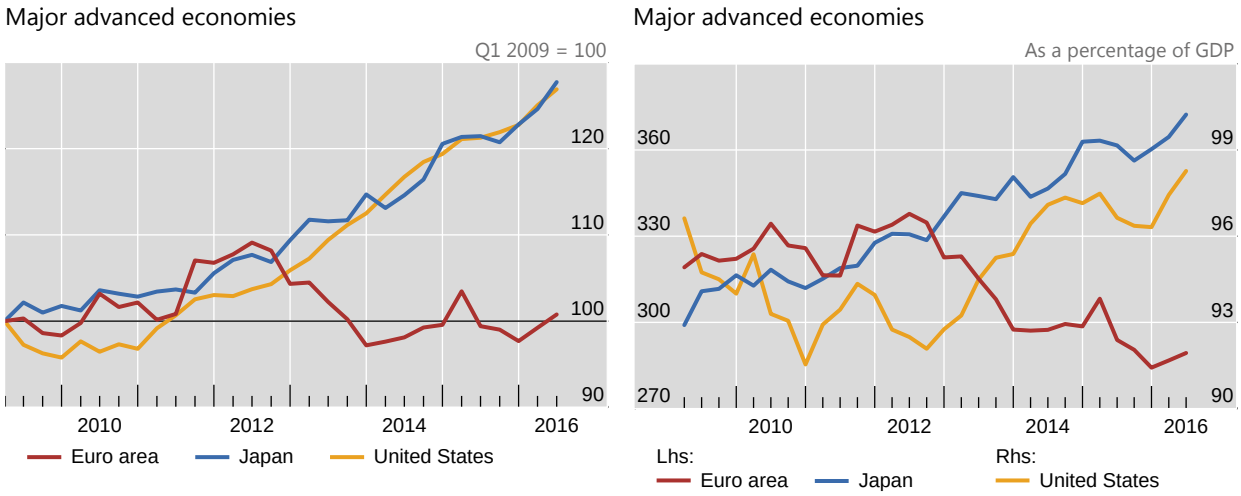
values. A bank's market capitalisation cannot be ignored, as it is a reflection of the value of the equity holders' stake, and hence an assessment by market participants of the creditworthiness of the bank as a borrower. If market participants harbour reservations about a bank's business model or creditworthiness, then market capitalisation is very thin, and the market-to-book ratio of bank equity is very small. In effect, this means that a greater proportion of the bank's value is held by the creditors, rather than the equity holders, and therefore that the bank has high market value leverage. The current low market-to-book ratios clearly indicate that market participants perceive banks as much more leveraged than their books suggest.

High market value leverage, in turn, impairs a bank's funding. A bank with higher market value leverage has less "skin in the game" and more incentive to take risks, which reinforces the market's perception of its lower creditworthiness, and further raises its cost of debt. High market value leverage may thus have knock-on effects and exert downward pressure on the banks' book leverage through tighter funding conditions.[7]

Many factors beyond regulation can affect a bank's market value. In a low growth and low interest rate environment, for example, banks' expected profits are low, the stock price is low and market value leverage is high, which leads to high-cost funding. Faced with high funding costs, banks reduce their book leverage by shedding assets. In other words, bank book leverage comes under pressure when market value leverage is high, as a reflection of the bank's reduced creditworthiness.

The downward pressures on leverage may not result in a reduction of total assets if equity grows to compensate. In this respect, Graph 5 shows that there are differences in total asset growth across the major economies.

The evolution of commercial banks' total assets[1] Graph 5



[1] Based on the aggregated balance sheet for the euro area (credit institutions) and flow of funds accounts for Japan (depository corporations) and for the United States (private depository institutions); resident institutions only.

Sources: ECB; Bank of Japan; Federal Reserve.

Total assets of commercial banks in the United States and Japan have grown since the crisis, whether in money terms (left-hand panel) or as a proportion of GDP (right-hand panel). However, total

[7] See Adrian and Shin (2014), op cit.

assets of banks in the euro area have not grown since 2009, and have fallen as a proportion of GDP. The deleveraging pressure exerted by the low stock market value of banks may have played a role here.

Graph 5 conveys an important lesson to policymakers more generally. If the objective is to ensure that banks can lend to support the real economy, their having adequate equity is crucial.

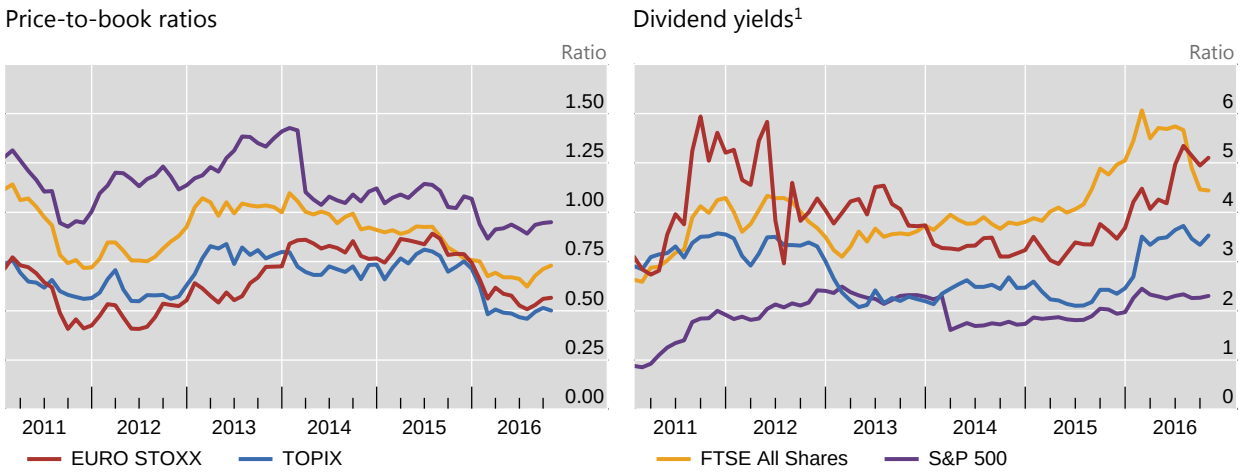
If only banks could raise more capital, they could alleviate concerns about their creditworthiness. However, raising new equity when the market price of bank stocks is low dilutes the incumbent shareholders' interests. There are severe challenges to raising new equity precisely when new equity would be most beneficial to a bank's lending operations.

In summary, a bank's low market-to-book ratio and its high market value leverage reflect a common cause – the fact that the bank has too little capital to enjoy unfettered access to market financing. Both the low market-to-book ratio and the high market value leverage are prominent features of the banking landscape at the moment. We need to give thought to why this combination persists, and what we can do about it.

Graph 6 puts the current low market-to-book ratios of banks in major regions into historical context. Every cloud has a silver lining. Low market capitalisation of a bank also means that any dividend that it pays is a substantial sum when viewed as a proportion of the share price. In other words, the low market-to-book ratio shows up as a high dividend yield of banks. Dividend yields for major bank stocks are close to or above 5%. They are even higher for banks that continue to pay dividends even when their market-to-book ratios are well below one.

Bank equities

Graph 6



[1] For each index, the dividend yield is defined as aggregate gross dividend per share over the last 12 months divided by the current stock price.

Source: Bloomberg.

In the current low interest rate environment, a 5% yield is an attractive proposition. But it also presents a conundrum. Banks pay out dividends to placate their investors, but the payouts may erode their capital positions further.

Indeed, there is the potential for second- and third-round effects through the funding costs of the bank. Low market-to-book ratios make it more attractive for investors to receive dividends. Paying out 1% of book equity entails a dividend yield of higher than 1% if the market price is below the book value of equity. Bank dividend payouts erode the common equity of the bank, weakening its capital position. With low capital, the perceived creditworthiness of the bank is eroded, exerting further pressure

to reduce lending and reduce book leverage, with a possible impact on future profitability and on the current share price, thereby completing the circle.

If the reinforcing dynamics take hold, the tell-tale sign is a combination of lower perceptions of creditworthiness, tighter funding costs and diminished profitability. Breaking this vicious circle entails the bank maintaining adequate capital levels and ensuring that its business model is sound. In an environment of low interest rates, we are seeing bank business models come under severe pressure.

5. Bank capital and the real economy

Let me now look at the relationship between capital, borrowing conditions and the real economy.

We should bear in mind that a bank is both a lender and a borrower; a bank borrows in order to lend. In this context, bank capital determines how good a borrower the bank is, and so affects the cost and quantity of the bank's funding operation – its treasury.

It is common sense that a good borrower can borrow on better terms. Borrowing on better terms means that the bank can pass on the cost savings to its own borrowers. Recent BIS work[8] finds that a 1 percentage point increase in the equity-to-total-assets ratio of the bank reduces its cost of debt by approximately 4 basis points, and is associated with a faster pace of lending growth of around 0.6 percentage points per year.

The left-hand panel of Graph 7 plots the relationship between the cost of the bank's borrowed funds and its overall leverage, defined as the ratio of a bank's total assets to its equity. Admittedly, the scatter is quite dispersed. Nevertheless, it is evident that, when the bank has more capital (lower leverage), it enjoys a lower cost of debt funding.

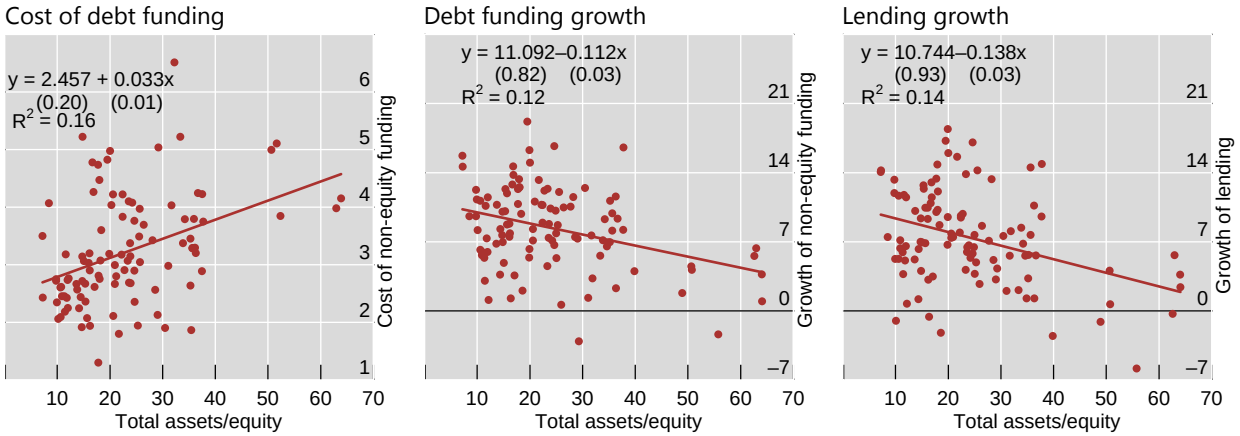
In turn, the lower funding cost translates into greater intermediation by the bank. The centre panel of the same graph shows that banks that have more capital, and hence lower funding costs, borrow funds at a faster pace. The upshot is that less leveraged banks expand their lending at a faster rate too. The right-hand panel shows this for the summary data. In the detailed analysis, we find that a 1 percentage point decrease in a bank's total assets to equity ratio is associated with a 0.6 percentage point uptick in the subsequent growth in lending.

The funding advantage is clearer still when banks are sorted according to their initial capitalisation levels. The cost advantage that comes from higher capital is larger for the banks that are more thinly capitalised.

[8] L Gambacorta and H S Shin, "Why bank capital matters for monetary policy", *BIS Working Papers*, no 558, April 2016.

Bank capital and loan growth[1]

In per cent — Graph 7



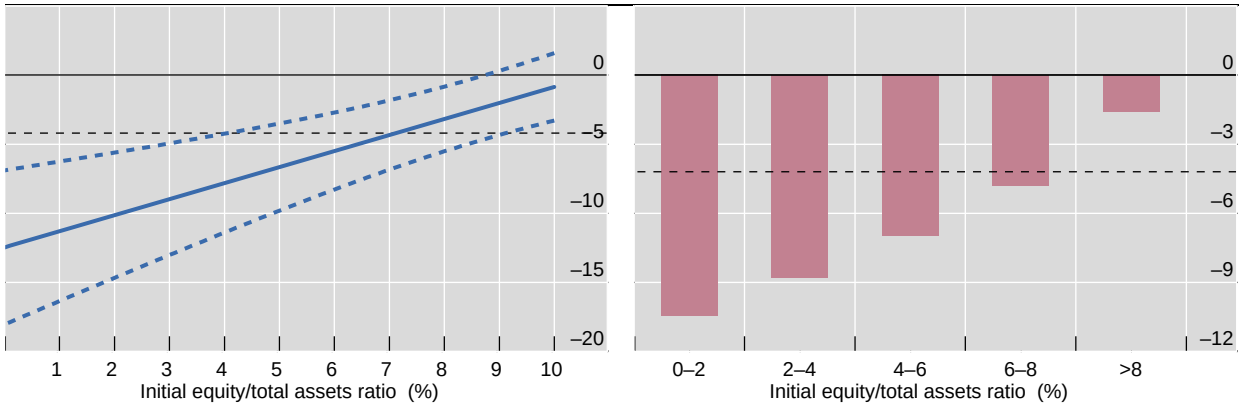
[1] The panels present scatter plots between the leverage of 105 advanced economy banks and the cost of funding (left-hand panel), the annual growth rate of debt financing (centre panel) and the annual growth rate of lending (right-hand panel). Standard errors are in brackets.

Source: L Gambacorta and H S Shin, "Why bank capital matters for monetary policy", *BIS Working Papers*, no 558, April 2016.

Graph 8 illustrates precisely this effect. The right-hand panel shows that 1 percentage point of additional capital to total assets results in a 10 basis point reduction in the cost of funding for thinly capitalised banks whose capital is below 2% of their assets. The cost advantage falls as the bank becomes better capitalised, but even for banks that have a leverage ratio of above 8%, there is still a noticeable reduction of the cost of funding, amounting to 2 basis points.

Non-linear effect of higher bank capital on the cost of funding

Reduction in the cost of funding, in basis points — Graph 8



Source: Gambacorta and Shin (2016).

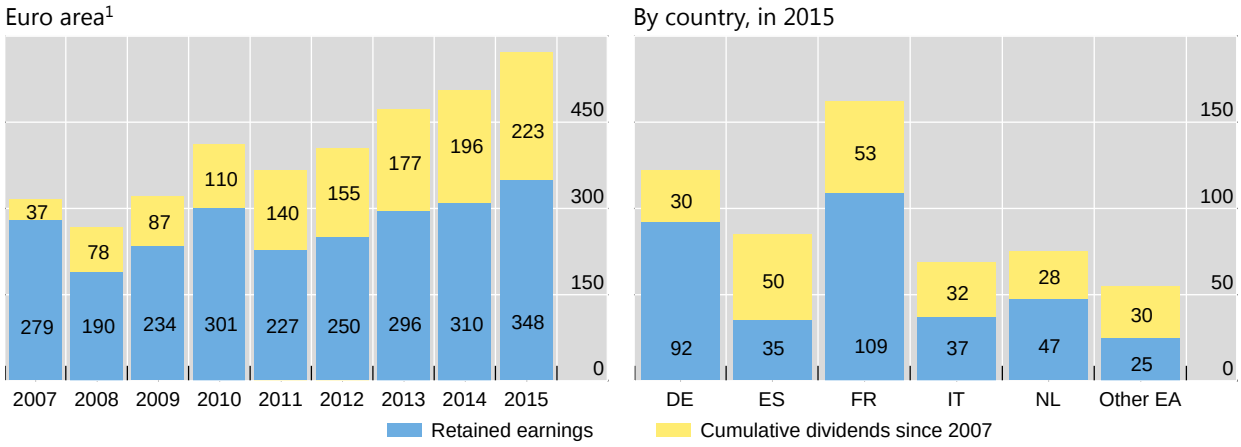
These findings carry an important message. Banks could themselves go a long way towards lowering their cost of debt funding, if they reduced their dividend payouts and retained more of their

profits, thereby adding to capital.[9] The relatively high level of banks' dividend yields suggests that there is scope for doing this without spooking shareholders.

However, banks have continued to pay out dividends at substantial rates. Graph 9 shows the total retained earnings and accumulated dividends of 90 euro area banks between 2007 and 2015. Dividends add up to €223 billion, while retained earnings were €348 billion. Had the profit been ploughed back into the bank rather than paid out as dividends, retained earnings would have been 223/348, or 64%, higher.

Total retained earnings and accumulated dividends of euro area banks

In billions of euros — Graph 9



DE = Germany; ES = Spain; FR = France; IT = Italy; NL = Netherlands; Other EA = other euro area countries (Austria, Belgium, Finland, Greece, Ireland and Portugal).

[1] Based on a sample of 90 euro area banks.

Sources: S&P Capital IQ; BIS calculations.

6. Concluding remarks on the role of regulation

To listen to some commentators, one would come away with the impression that the current problems weighing on the banking sector would disappear if only we dialled back the post-crisis efforts to strengthen regulation.

My arguments suggest that the diagnosis of what is ailing the banking sector is more complex. While regulation is one element of the business environment that banks take into account in their capital allocation decisions, the underlying challenges to banking in recent times seem to be more deeply rooted in low profitability and unnecessarily costly funding. Repairing balance sheets and increasing capital through greater retention of profit as retained earnings would mitigate many of the problems

[9] Consider a balance sheet of size 100, with equity of 10. If equity is raised to 11, a 4 basis point reduction in the cost of borrowed funds results in a cost saving of 0.0004 x 89 = 0.0356. If the cost of equity is assumed to be 10%, the cost of equity funding is 1 when equity is 10, and 1.1 when equity is 11. The additional cost of equity is 0.1. The reduction in the cost of borrowed funds is 36% of the supposed incremental cost of equity.

facing the banking sector. That being said, we will of course continue to monitor the effects of regulation on banks. My hope is that banks will next year be less busy with new regulatory issues, and more dedicated to their clients, more focused on their core activities, and more busy exploiting new financial technologies.