

Bank Lending Puzzles: Business Models and the Responsiveness to Policy

by
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Banks are still dealing with historic losses buried in their balance sheets. As a result, the US economy is picking up only modestly and Europe is sinking further into recession, despite unprecedented low interest rates and policies to compress the term premium. The aim of this study is to explore the business activities of banks, with a special focus on their lending behaviour, and its responsiveness to unconventional monetary policy. The paper shows that deleveraging has been mainly via mark-to-market assets falling in value, and policy is now serving to reflate these assets without a strong impact on lending. A panel regression study shows that GSIFI banks are least responsive to policy. Non-GSIFI banks respond to the lending rate spread to cash rates, the spread between lending rates and the alternative investment in government bonds, and the distance-to-default (the banks solvency). The paper shows that better lending in the USA is a result of safer banks and a better spread to government bonds—yields on the latter are too attractive relative to lending rates in Europe. Finally, the paper comments on the problem of using cyclical tools to address structural problems in banks, and suggests which alternative policies would better facilitate a financial system more aligned with lending, trust and stability and less towards high-risk activities and leverage via complex products.

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I. Introduction

The crisis was characterised by sharp increases in the leverage of financial firms. This was accomplished mainly via the increased holdings and values of securities and derivatives, particularly in jurisdictions where investment banking activities are important, and less so by loans to households and companies¹. Dealing with the losses on securities and structured products is the reason why the financial system remains impaired, recession or very slow growth persists and lending by banks (large or small) is failing to support the recovery. The root causes of this problem from the late 1990's were the changing business models of banks, the under-pricing of risk and badly misaligned regulatory incentives. However, while there have been slow-track and modest attempts to reform the regulatory process, the main approach to avoiding total collapse of the financial system has been the direct support for banks, and monetary policies that are so unconventional that there is simply no adequate historic benchmarks against which to judge them. This approach risks pumping up leverage again via securities and derivatives values, leaving the structure of the financial system not significantly different from that which created all the problems in the first place. This paper explores this dilemma and offers an explanation of bank behaviour and the trade-offs between monetary policy and better structural and regulatory policies.

The US Federal Reserve, the ECB, and the Bank of England have conducted a policy of low interest rates and/or the unconventional policies of buying out along the yield curve to reduce the term premium in sovereign bonds. Most recently, announcements from the Bank of Japan suggest that they too will follow suit, and this has seen a sharp fall in the yen. A weakening yen, and a rising risk appetite for yield in emerging markets, also risks seeing quantitative easing spread beyond OECD economies to Asia. These policies are expressly designed to increase risk taking: to move banks away from cash and sovereign bonds in favour of lending to businesses; and to increase the relative attractiveness of corporate debt and equities. Risk taking by portfolio investors has indeed increased or, rather, they have been forced out of low-yield low-risk assets in the search for higher yields in equities and corporate bond markets. This has led to an extraordinary rally in higher yielding corporate bonds, and the equity market too has rallied strongly. But so far unprecedented low rates, quantitative easing and increased portfolio risk taking have not translated into a recovery even four years after the worst point in the crisis. The US economy is picking up only moderately, and unemployment remains stuck at high levels. In Europe, where banks play a more important role in funding companies, the recession seems to have gathered pace in early 2013, and banks continue to cut lending.

This unprecedented situation can only be due to the fact that the banking system still has not dealt with its historic losses, despite all the support being given to it, and that trust and confidence in the financial system has not been restored.

The aim of this study is to explore the influences on the business activities of banks, with a particular focus on lending behaviour, and to comment on policy alternatives that might better align monetary and structural policies to facilitate a financial system balanced more towards lending and less towards high-risk securities and derivatives activities—a financial system less vulnerable to sudden losses and which

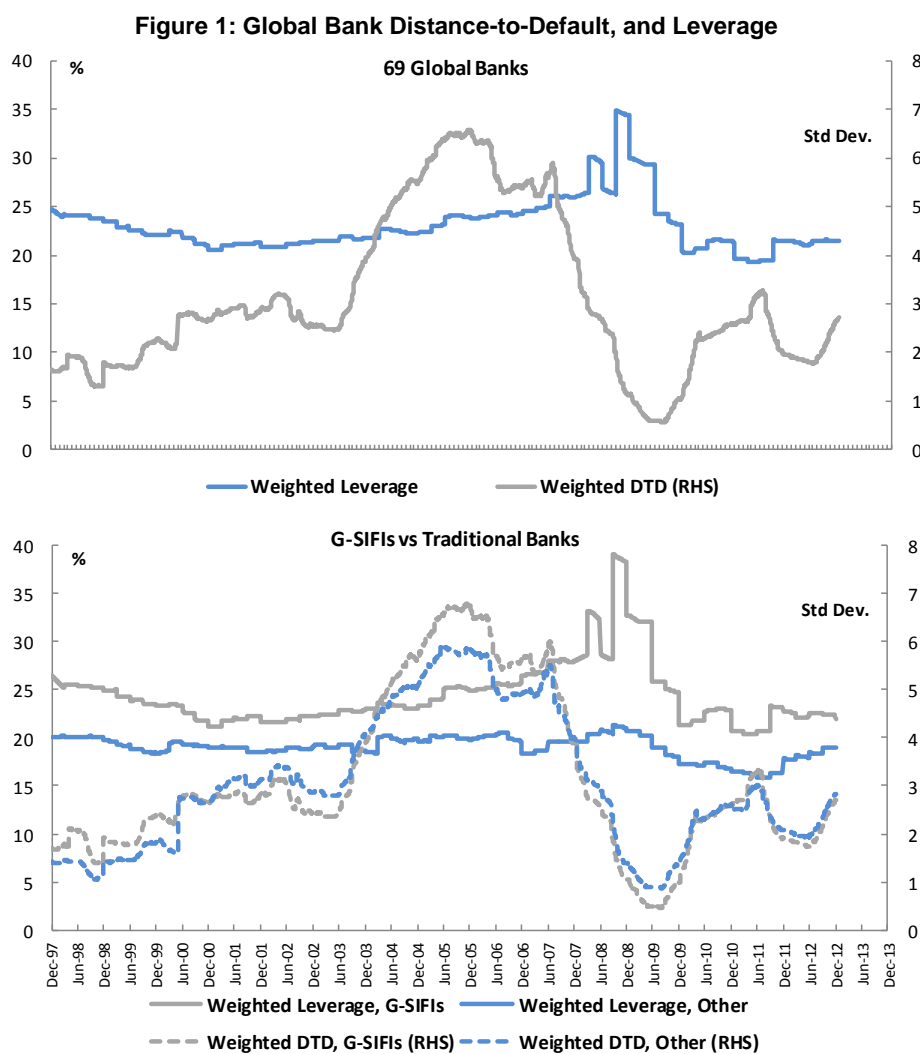
engenders more trust. One puzzle analysed, that bears on this issue and from which some policy insights can be gained, is why lending remains so weak in Europe compared to the United States.

Section II examines bank leverage and misaligned regulatory incentives that undermined capital requirements. Deleveraging now appears to be getting back to 1990's levels, and banks report strong compliant capital positions, but lending still has not returned to normal. Section III then examines the very different balance sheet developments between loans, derivatives and other assets (securities) in Europe, the UK and the USA. Loans of the banks considered in the study are falling in Europe and improving in the USA. Deleveraging has mainly been via the falling fair value of securities, particularly in Europe. The risk is that the current stance of monetary policy will simply reflate these asset values and increase leverage without improving the share of lending in banks portfolios to support the economy. This would leave the shape of the financial system not very different to what it was prior to the crisis. Panel regression techniques and a large amount of individual bank data are used in section IV to provide some evidence on bank portfolio behaviour in a model dependent on relative lending rate spreads to cash rates and to sovereign bonds, macro demand-side features in the asset price cycle, a variable capturing business model characteristics, loan loss provisioning and financial fragility captured by the distance to default (DTD) variable. Section V uses the results of the panel regressions alongside some of the key developments in policy-related variables to explain some of the puzzles in bank lending behaviour: between GSIFI banks and traditional banks, and between the weak-lending European banks versus those in the USA. Much of this latter difference is attributed to unconventional monetary policy in the USA. Finally, some concluding remarks are made in section VI, focusing on the likely causes of the failure of policy to translate into better economic performance, and what areas policy makers might look at to improve this situation. Macro policy, unconventional monetary policy, regulations, supervision and policies to separate banks according to their business model characteristics are considered.

II. Leverage and Bank Gaming of the Regulatory Rules

Figure 1 shows the asset-weighted simple leverage ratio of 69 global banks² from 1997 to 2012. The chart also shows the DTD of these 69 banks weighted by their share of assets. The DTD is the market value of assets (derived from the Black-Scholes formula) versus the book value of debt, measured in standard deviations from the default point of zero.³ High numbers of the DTD are associated with a profitable well-capitalised banking system.

For the population of 69 banks, leverage rose from around 18-times in the late 1990's to a peak of 24 times bank capital on the eve of the crisis. The bottom panel of Figure 1 breaks out the leverage and the DTD calculations between the GSIFI banks, and the more traditional banks. The growth of product innovation and the reduced control over leverage posed by official regulations saw the weighted GSIFI banks leverage rise from around 21-times capital prior to the removal of Glass-Steagall to 34-times on the eve of the crisis. The other large banks also raised leverage through the 2000's, though not to the same extent as the GSIFI's. The amplitude of the DTD calculations before the crisis is much greater for the GSIFI banks than for the more traditional banks—profitability and share prices rose more sharply—but after the crisis the DTD's are highly correlated in the downward direction.



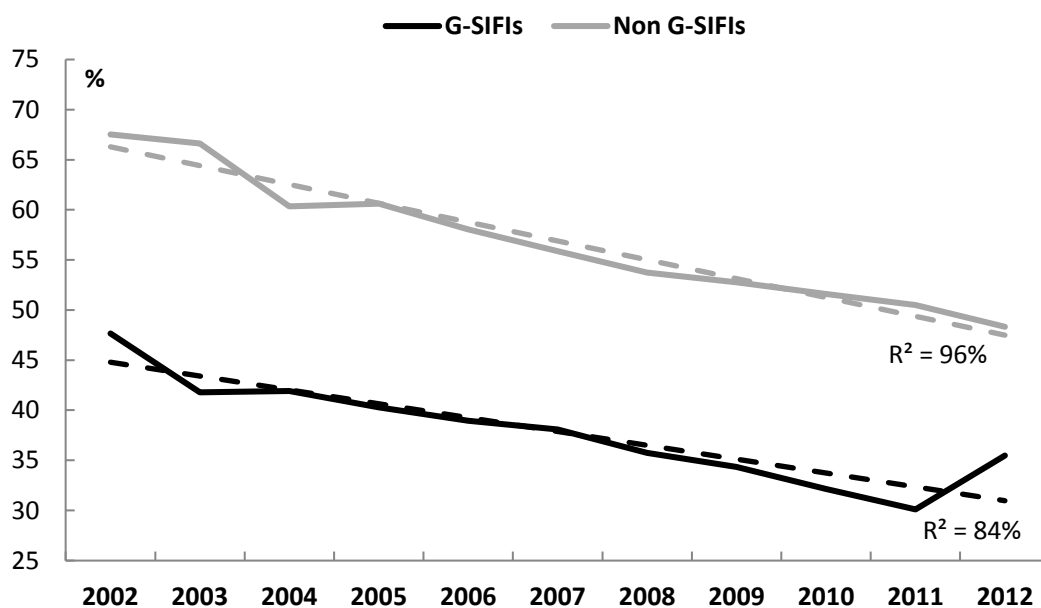
For the large GSIFI banks, innovations through capital markets securitisation of loans and the huge demand for structured products to arbitrage the tax system made possible large hitherto unexploited profit opportunities. More traditional banks, to the extent that they securitised assets and moved them off their balance sheets, did not see leverage rise as much compared to the GSIFI banks where derivatives and securities products and warehousing came to play a much larger role. The main policymaker thinking at this time favoured deregulation for better efficiency and growth, while banks took advantage of this to minimise capital costs and raise their ROE's. As the Basel Tier 1 ratio applies to risk-weighted assets (RWA), banks operate to reduce the ratio of RWA to total assets (TA) via a variety of sources, enabling leverage to rise even as regulations tried to ensure banks had stronger capital buffers:

- Banks argued successfully for the repeal of US separation policies that limited their international business models. Just when European universal banks might have benefitted from the separation of traditional and investment banking, the regulatory and business model trends were in exactly the opposite direction. The main drivers of bank lobbying in this regard were the profitability of leverage, high OTC derivative spreads, and the business model need to have sufficient diversity of market views and scale amongst derivative counterparties.⁴

- Banks consistently supported regulations under the Basel II “consensus” approach to regulation because it permitted them to keep capital requirements at low levels. The announcement of Basel II in July 2004 (to have been implemented by 2008), and the SEC’s removal of leverage controls on investment banks, actually encouraged the rapid growth in leverage and the profitability of banks.⁵
- Banks carried out risk-weight optimisation to reduce capital costs by: biasing portfolio choices to assets carrying less capital requirements; valuing assets and their relative riskiness with their own models—no two banks having the same model system—and manipulating the outcomes;⁶ transforming the riskiness of assets and shifting their ownership with derivatives; and securitisation and the creation of special purpose vehicles (SPV’s) to move products off their balance sheets.
- The Basel rules also permitted banks to use broad concepts of capital to satisfy the numerator of the Tier 1 ratio (including subordinated debt, hybrids, etc), instead of (costly) pure equity, with each jurisdiction seemingly allowing different rules that were best suited to the profitability of their own banks.
- Confidence to operate at high levels of leverage was also fostered by the too-big-to-fail (TBTF) phenomenon. Large global banks were prime beneficiaries of official funding mobilized by the IMF for the Latin America and Asia crises during the 1980s and ‘90s—essentially bailing them out, which was to help banks and investors correctly anticipate the bailouts in the recent crisis. Similarly, the presence of the lender-of-last resort function for ‘banks’ gives creditors confidence that they are unlikely to lose any money⁷. Both phenomena enhance confidence to trade in high-risk activities, including derivatives, facilitating the under-pricing of the risks and raising the volume of business compared to what it would otherwise be.
- Traditional banks were able to use most of the same techniques, if they were large enough to have model-based risk weighting. But even smaller banks were able to deal in assets that carried lower risk weights, and most importantly with other financial firms that carried low 20% risk weights. This raised interdependence (and hence risk) while simultaneously avoiding capital charges that applied to traditional loans and other securities. These banks were also able to securitise loans, insure them, obtain unrealistic credit ratings and keep them on balance their balance sheet but with lower risk weights.
- Finally, the entire Basel risk weighting framework and the proposed liquidity rules works to discriminate against non-bank enterprises—which typically carry higher risk weights and which are certainly not liquid.

Figure 2 shows the ratios of RWA/TA for 27 GSIFI banks (i.e. 21 GSIFI banks defined by the FSB and 6 former GSIFI banks that failed in the crisis⁸), and 564 non-GSIFI banks from 2002 to the end of 2012. The systematic gaming of the Basel system noted in earlier publications is evident in the downward trends. The traditional banks asset-weighted average ratio fell from 68% in 2002 to 47% in 2012. The GSIFI banks were able to reduce the average ratio from 48% in 2002 to 36% in 2012, with some individual large banks managing to reduce it below 20%.

Figure 2: Ratio of RWA/TA for GSIFI & More Traditional Banks

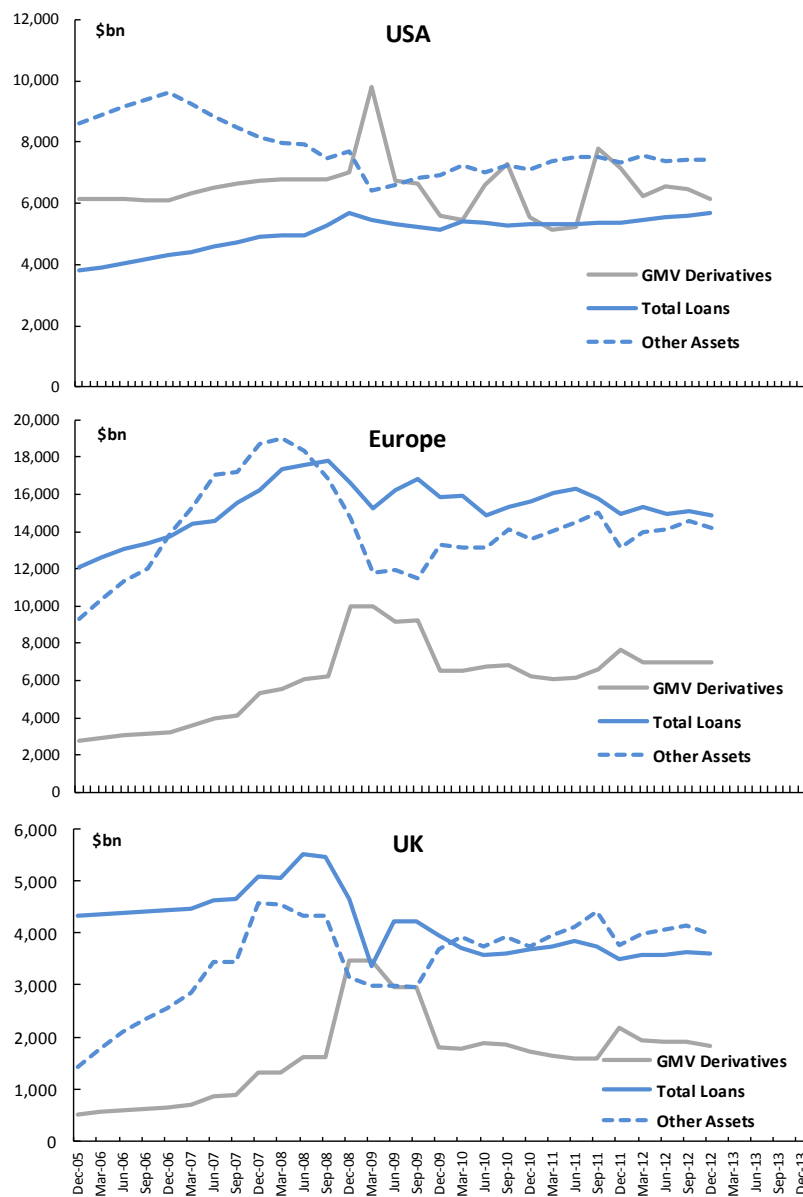


Source: Bloomberg, OECD.

III. Balance Sheet Trends: USA versus Europe and the UK

Figure 3 shows the balance sheet composition of 593 global banks in the USA (485) and Europe and the UK (108)—where US banks' balance sheets are converted to a comparable IFRS basis. In 2005, total assets of these 593 banks stood at \$42.6tn, of which the GMV of derivatives was \$8.8tn, loans \$15.9tn and other assets (essentially securities and cash) were \$17.9tn. On the eve of the crisis, at the end of 2007, just 2 years later, total assets had grown to \$60tn, a 40% rise, dominated by other assets and derivatives, which grew by 50% and 36%, respectively. In 2007, loans were \$21.1tn, 35% of the business of those banks.

Figure 3: Balance Sheet Composition 593 Banks in USA, Europe and the UK



Source: Bank balance sheets, Bloomberg, OECD. The numbers represent the sum of large numbers of banks' business activities in derivatives (GMV) (on an IFRS basis for the USA), lending, and all other (securities etc.).

- At the worst point in the crisis, between the 4th quarter of 2008 and the first quarter of 2009, the value of the GMV of derivatives exploded upwards with volatility in prices to \$19.8tn (from \$12tn in 2007Q4), occasioning margin and collateral calls.
- The trend in derivatives (mainly the GSIFI banks) remains upwards, aside from the volatility spike, despite their damaging role in the crisis and the problems caused during 2008. This means that the next major bout of volatility—for example related to a sell-off in corporate and other high yield debt—will almost certainly cause some banks to have new margin call problems for which cash collateral will be required.

- ‘Other assets’, comprising securities and structured products, collapsed and mostly in Europe (-\$4.4tn, from \$26.8tn to \$18.2tn, between 2007Q4 and the end of 2012). This has been the major avenue of deleveraging. Banks should bring such losses through to their income statements, if they are not ultimately recoverable. It is highly likely that some considerable portion of these assets are impaired and are still being worked through, particularly in Europe, crippling the ability of affected banks to lend.
- Loans are relatively lower in the USA, vis-a-vis other assets, because corporate bond markets play a bigger role for financing companies and because Fannie Mae and Freddy Mac are government-supported institutions that play such a huge role in the mortgage market. Loans overall have fallen in absolute terms from 2007Q4 to the end of 2012 (from \$21.1tn to \$20.6tn). Most of this decline in loans is concentrated in Europe (-\$1.3tn) and the UK (-\$1.5tn). Loans rose in the USA.

What is worrying about these trends is that the fall in leverage has mostly been via the value of securities, which may be easily ‘pumped up’ again if monetary policy succeeds in reflatting asset prices. This is already beginning to happen in the USA, where other assets are on an upward trend rising more quickly than for loans. This would leave the financial system much like it was before the crisis. The aim of policy should be to have leverage build up not through the securities businesses of investment banks, but instead via loans that support real economic activity and employment. The rest of this paper focuses on the determinants of the share of bank loans in their asset portfolios.

IV. Determinants of Bank Loans

To investigate the determinants of banks’ supply of credit to the non-bank sector, a fairly standard model incorporating supply and demand features is postulated, following previous literature, but is augmented by a solvency measure based on a DTD measure.⁹ The dependent variable is the share of total loans in banks total assets portfolio (LO_TA).

The explanatory variables are:

- (1) Relative returns: the bank lending rate to non-banks compared to the return on loans to other banks (interbank rate), and loans to government:
 - The lending rate to cash rate spread in the country location of the bank (BLR_CB) is the difference of average bank prime lending rate and central bank three months repo rate. The LO_TA is expected to have a positive relationship with the loan variable.
 - The lending rate to ten-year government bond yield spread in the country location of the bank (BLR_GBY) is the difference between average bank prime lending rate and the ten-year government bond yield. The LO_TA is expected to have a positive relationship with this variable.
- (2) The pressure banks might face in terms of potential write-downs of existing loans, through loan-loss provisions and overall inadequate capital that might lead to insolvency in the event of continued financial stress:
 - Loan-loss provisions related to the credit quality of loans (LLP_TA) is the ratio of loss provisions to total assets in the previous period. The LO_TA is expected to have a negative relationship with this variable.
 - Bank financial distress is measured by the distance-to-default (DTD). It is the number of standard deviations away from the default point based on a sophisticated measure described in Appendix

1. To derive the measure, it is assumed that a bank defaults when the market value of assets equals (or is lower than) than the book value of debt. This measure uses the Black-Scholes model for capitalising equity to calculate the former. A bank defaults (or is bankrupt) when the distance-to-default equals 0 (or is negative). The LO_TA is expected to have a positive relationship with this variable.
- (3) Banks have quite different business models: at one extreme traditional banks focus on intermediating between stable depositors and borrowers, and at the other large GSIFI banks focus on securities businesses and derivatives. All banks tend to do some of each and there is a continuum of models in between the extremes. But the closer one moves towards the large GSIFI model, small business and household lending is more limited, and banks instead focus on syndicated lending and large corporate clients, which are less likely to be driven by the above relative price factors. Banks that are more focused on lending will tend to have a higher RWA_TA ratio, will be better capitalised and their amortised cost accounting products are less vulnerable to risks of volatility of prices in capital markets.
- Bank business model (continuum) proxy (RWA_TA) measures the risk-weighted assets of each bank versus its total assets (see Figure 2). The LO_TA is expected to have a positive relationship with this variable.
- (4) Changes in real estate prices in the country location of the bank are included to capture both macroeconomic demand and supply-side conditions. Rising prices are associated with better employment and lower interest rate, and lead to speculative demand patterns as well as helping loan to value ratios from the collateral side.
- Macro demand side proxy (HP_CHG) is the annual per cent change in the house price index of the country location of the banks. The LO_TA is expected to have a positive relationship with this variable.

The model:

A panel regression approach is used to explain the differences in supply of loans as a share of the banks' asset portfolio. This econometric analysis is run on a sample of 468 US and European publicly traded commercial banks and broker dealers over the period 2005-2011. Only listed banks are included in the sample because market data are required for the model. These banks encompass all of the main counterparties for capital markets products (particularly bonds and derivatives). The sample also encompasses the 21 G-SIFI banks which are listed in the USA and in Europe, as defined by the Financial Stability Authority in November 2011. In addition, banks that failed in the crisis that started in 2007, but which can be considered as G-SIFIs, such as HBOS, Merrill Lynch, Lehman Brothers, Washington Mutual, Wachovia and Bear Stearns are included. The sample consists of 27 G-SIFIs, 89 European banks and 352 US banks.

Annual consolidated financial statements were extracted mainly from Bloomberg. Some other data were extracted from Datastream to compute our macroeconomic indicators. Table 1 presents the distribution of banks by country to illustrate the representativeness of the sample. This table shows: the asset share of banks included in the sample versus those for the whole banking system; the asset share of GSIFI banks; the loan share for GSIFI banks; and the loan share of more traditional banks. With one or two exceptions, the loan share of GSIFI banks is much lower than for other banks. Over the 2005–2011 period, the sample of banks covers, on average, 69.3% of the total assets of U.S. commercial banks as reported by the Federal Deposit Insurance Corporation (FDIC) and 53.1% of the assets of European commercial banks, as reported by the European Central Bank (ECB).

Table 1: Some Characteristics of the Data

| COUNTRY | Banks included in the sample | Of which G-SIFI banks | Total assets of banks in final sample / total assets of the banking system (%) | Total assets of G-SIFI banks in final sample / total assets of the banking system (%) | Average share of loans / total G_SIFI banks' asset portfolio | Average share of loans / total traditional banks' asset portfolio |
|----------------|------------------------------|-----------------------|--|---|--|---|
| United States | 365 | 13 | 69.3 | 56.0 | 25.2 | 59.8 |
| Europe | 103 | 15 | 53.1 | 23.9 | 42.8 | 58.4 |
| Austria | 5 | 0 | 36.9 | 0.0 | - | 57.4 |
| Belgium | 2 | 1 | 98.2 | 61.8 | 49.2 | 44.2 |
| Denmark | 4 | 0 | 55.3 | 0.0 | - | 58.4 |
| Finland | 3 | 0 | 9.1 | 0.0 | - | 42.6 |
| France | 6 | 3 | 79.1 | 68.3 | 28.3 | 33.2 |
| Germany | 7 | 2 | 42.3 | 38.3 | 25.5 | 47.7 |
| Greece | 7 | 0 | 75.5 | 0.0 | - | 67.4 |
| Ireland | 3 | 0 | 40.7 | 0.0 | - | 64.0 |
| Italy | 19 | 1 | 72.0 | 30.3 | 60.9 | 67.1 |
| Netherlands | 2 | 0 | 7.1 | 0.0 | - | 62.5 |
| Norway | 3 | 0 | 33.9 | 0.0 | - | 64.8 |
| Portugal | 4 | 0 | 49.8 | 0.0 | - | 70.6 |
| Spain | 9 | 1 | 82.2 | 34.2 | 61.2 | 67.9 |
| Sweden | 4 | 1 | 12.8 | 5.6 | 56.8 | 61.3 |
| Switzerland | 18 | 2 | 68.7 | 63.1 | 17.8 | 77.0 |
| United Kingdom | 7 | 4 | 85.6 | 81.4 | 42.5 | 48.0 |

Source: Datastream, Bloomberg, FDIC. This table reports the average value from 2005 to 2011 (country by country) of the ratio shown for a sample of 468 U.S and European publicly traded commercial banks and broker dealers.

The dependent variable (LO_TA) at time t is regressed on the set of microeconomic and macroeconomic variables set out above that correspond to time $t-1$, to identify the main factors that drive the bank lending share.¹⁰ The empirical model is specified in equation (1), where the subscripts i and t denote the bank and the period, respectively:

$$LO_TA_{i,t} = \alpha_{i,t} + \beta_1 * DTD_{i,t-1} + \beta_2 * LLP_TA_{i,t-1} + \beta_3 * RWA_TA_{i,t-1} + \beta_4 * BLR_CB_{i,t-1} + \beta_5 * BLR_GBY_{i,t-1} + \beta_6 * HP_CHG_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

This equation is estimated using ordinary least squares (OLS). After testing for cross-section versus time-fixed versus random effects, and for the heteroskedasticity of error, the required cross-section and time-fixed effects were introduced into the regression, as was the White cross-section covariance method.

The results:

The multivariate regression is run on the full sample of banks. The banks are then separated, and the regressions are run for: (i) the 28 G-SIFI banks included; (ii) the other banks not considered G-SIFI's. The results are shown in Table 2.

Table 2: The Determinants of Banks' Supply of Credit

| | All banks | G-SIFIs | Non G-SIFIs |
|----------------------|----------------------|--------------------|----------------------|
| DTD | 0.002 *** (2.59) | 0.002 (0.49) | 0.002 *** (2.93) |
| LLP_TA | -0.32 *** (-5.44) | 0.14 (0.55) | -0.37 *** (-6.03) |
| RWA_TA | 0.004 (1.37) | 0.15 ** (1.95) | 0.004 (1.45) |
| BLR_CB | 1.15 *** (4.11) | 1.01 (1.16) | 1.23 *** (4.16) |
| BLR_GBY | 0.91 *** (8.42) | 0.47 (0.78) | 0.89 *** (8.02) |
| HP_CHG | 0.06 ** (2.13) | -0.06 (-0.51) | 0.06 ** (2.25) |
| C | 0.62 *** (68.10) | 0.30 *** (7.08) | 0.63 *** (65.21) |
| R² | 0.91 | 0.77 | 0.88 |
| Fisher Stat | 48.49 | 72.30 | 36.69 |
| P-Value F | 0.00 | 0.00 | 0.00 |
| Total Obs. | 2688 | 125 | 2563 |

Note: This table shows the results of estimating single regressions for an unbalanced panel of 468 U.S. and European publicly traded commercial banks and broker dealers over the 2005-2011 period. The sample consists of 27 G-SIFIs (the 21 G-SIFIs as defined by the FSB (2011) and 6 banks that failed in the crisis that started in 2007, but which can be considered as G-SIFIs, such as HBOS, Merrill Lynch, Lehman Brothers, Washington Mutual, Wachovia and Bear Stearns) and 441 other banks. See Section IV for the definition of the explanatory variables. All explanatory variables are one-year lagged. Cross-section and time fixed effects are used in the regressions as is the White cross-section covariance method. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

For the full sample, most variables are significant and their coefficients have the expected signs. The loan-loss provision variable is significant at the 1% level: so when loan loss provisions have risen in the previous year, banks will likely be reducing their loan portfolio in the current period. However, more general problems of the state of a banks' solvency also affect a banks' ability to lend are best captured by the DTD variable. Because it uses market information, it is better able to look through un-transparent reporting and regulatory forbearance issues. This variable too has the correct sign and is significant at the 1% level. The two lending spreads, versus cash and government bonds, are significant at the 1% level. A higher lending rate relative to cash and bonds increases the incentive to lend. The bank business model proxy in the ratio RWA_TA is not supported by the full sample of banks. Finally, the macro demand control variable in house prices also finds support at the 5% level. An increase in real estate price tends to (pro-cyclically) boost the demand for and supply of loans.

The results for the GSIFI banks are quite different to those for the full sample. GSIFI bank loans tend to be a constant share of the asset portfolio, conditioned by the business model proxy RWA_TA, which is significant at the 5% level. GSIFI bank lending is not responsive to relative interest rates, which are presumably where monetary policy and other macro prudential policies hope to have some influence, nor is the DTD term supported by GSIFI data. These banks are more focused on securities and derivatives businesses, from which the bulk of their profitability has traditionally been derived.

The results for the more traditional bank subsample, i.e. those not considered GSIFI's, are much closer to those for the full sample. Lending by these banks is responsive to relative price signals (the two interest rate spreads), is heavily influenced by loan-loss risks and by the extent to which the bank diverges from the default point (the DTD). The macro house price cycle is very relevant to lending by traditional banks.

Model elasticities

Table 3 shows the 1st round effect on the rate of growth of lending from a policy change of the magnitude shown (without simulated feedback effects) for the case of a 50% loan portfolio share for a traditional bank and a 30% share for a GSIFI bank.

Table 3: Model Policy Impacts on the Growth Rate of Loans

| Policy Measure (Traditional Bank 50% Loan Share; GSIFI 30% Loan Share) | GSIFI % Chg Loans | Traditional % Chg Loans |
|--|-----------------------------|-----------------------------------|
| Increase DTD 0 to 3 Std Deviations | 0.00 | 1.20 |
| Reduce LLP 1% of TA | 0.00 | 0.74 |
| Raise Sprd to Cash 100 basis points | 0.00 | 2.46 |
| Raise Sprd to Bonds 100 basis points | 0.00 | 1.78 |
| Raise House Price 5% | 0.00 | 0.60 |
| Raise RWA/TA by 10 percentage Points | 5.00 | 0.00 |

Source: OECD. This table shows the 1st round effect on the rate of growth of lending from a policy change for an unbalanced panel of 468 U.S. and European publicly traded commercial banks and broker dealers over the 2005-2011 period. The sample consists of 27 G-SIFIs (the 21 G-SIFIs as defined by the FSB (2011) and 6 banks that failed in the crisis that started in 2007, but which can be considered as G-SIFIs, such as HBOS, Merrill Lynch, Lehman Brothers, Washington Mutual, Wachovia and Bear Stearns) and 441 other banks. See Section IV for the definition of the variables.

The model elasticities are very different for GSIFI versus traditional banks. The aim of easy monetary policy is to increase risk taking, and this includes the lending activities of banks: by reducing the cost of funding, and given the state of competition in banking, spreads will widen to a degree making it more attractive to lend. Banks could buy government bonds, so policies to compress the term premium, being followed in the USA for example, raise the lending rate spread to this risk free asset too—further encouraging lending.

However, GSIFI bank lending is essentially impervious to policy measures on interest rates, and regulatory policies that make banks safer. The only significant factor for these very large banks, other than the constant term, is the RWA_TA variable. Each 10-percentage point rise in the ratio of RWA_TA would increase the lending share and, from a base of a 30% share, would increase average lending by sizeable 5%. A regulatory policy that placed a minimum level for the ratio RWA_TA, for example at say 50%, would limit the extent to which GSIFI banks could carry out the risk-weight optimisation strategies through the use of models and derivatives. This would be effective in forcing a rise in the share of lending. Under the Basel approach such a rule would ensure a larger asset base to which the Tier 1 ratio could be applied for capital/leverage purposes, so the bank would also be safer.

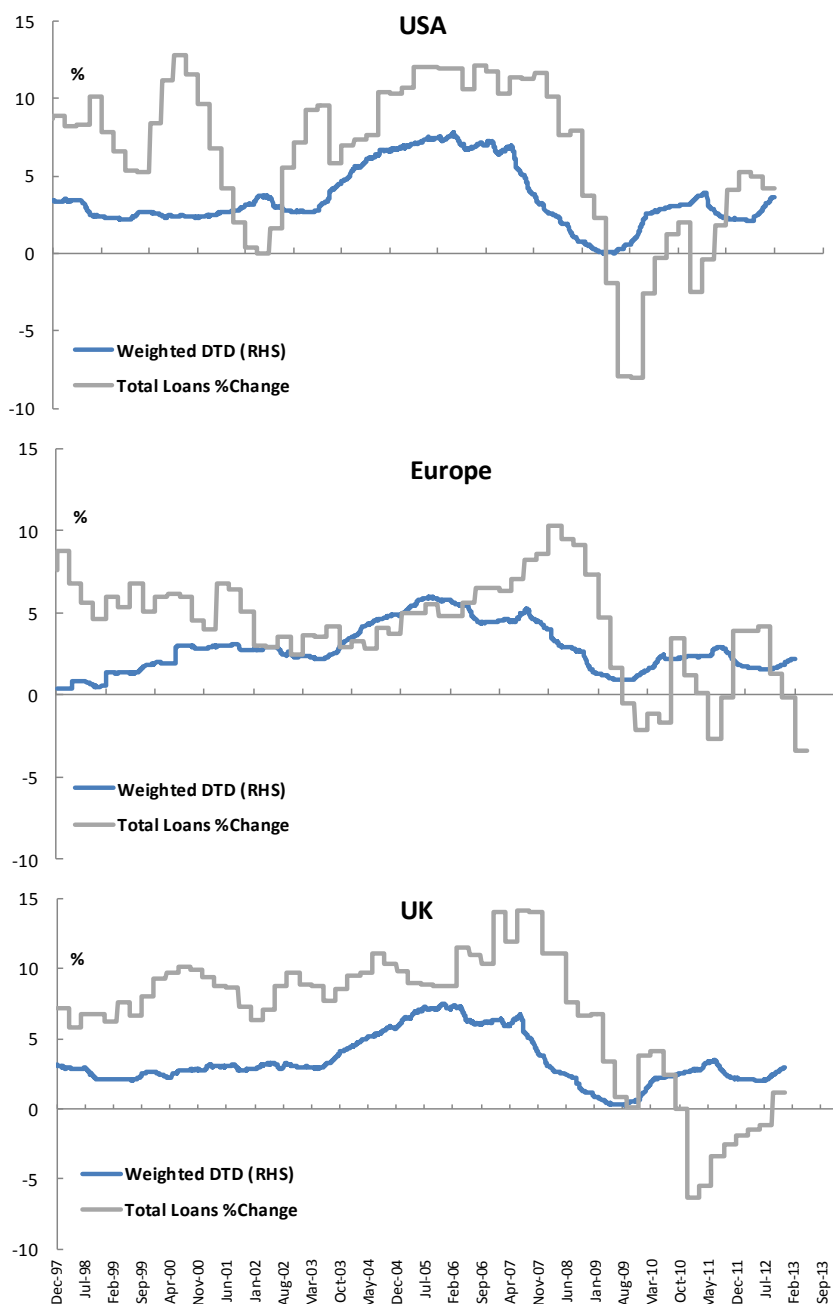
A policy of separating the GSIFI banks into retail and securities businesses would be helpful to increase lending and to improve the responsiveness to regulatory and monetary policies. Even if supervision could raise the DTD, for example by improving bank models and introducing more rules, it would not increase lending in a GSIFI bank unless it raised the RWA_TA ratio. On the other hand a traditional/retail bank, separated from the GSIFI group, would automatically have a higher RWA_TA ratio, as it would have much less scope to game the Basel rules via the channels discussed in section III, by valuing illiquid securities with internal models and by using derivatives and netting procedures. Its capital

base would be therefore higher. Furthermore, the separation approach would create more traditional banks of some size that would be safer and, hence, would lend more. These separated banks would also be much more responsive to interest rate regulation and supervision policy measures.

The traditional banks are much more responsive to monetary, regulatory and supervisory policy approaches.

- Safer banks make for better lending, as shown by the DTD calculations and the lending cycle of the related banks in Figure 4. A rise in the DTD from 0 to 3 standard deviations (a level which prevailed in the period well before the crisis) would on average, for a bank with 50% of loans in its total assets portfolio, increase lending by 1.2% pa compared to otherwise. Earlier research shows that the DTD is most strongly negatively related to the amount of derivatives (IFRS basis), wholesale funding and the un-weighted leverage ratio.¹¹ As traditional banks in the sample hold few derivatives on their balance sheet, the policy implication here is that a tougher simple leverage ratio and a reduction in wholesale funding (to make the DTD higher) would be the best approaches to improve lending attitudes. Certainly a business model based more on retail deposits would provide a more stable funding base, which would work to support lending.
- Were supervision measures and other rules able to improve underwriting standards sufficiently to reduce LLP_TA by a significant 1% of assets, this could be associated with loans rising a further 1.3% above where they would otherwise be (from a 50% base share on loans).
- Traditional banks are certainly responsive to interest rate and unconventional monetary policy measures. A 100bp rise in the spread to cash would increase lending on average by a very powerful 2-1/2% (from a 50% lending share).
- A 100bp rise in the spread to government bonds, were policies of compressing the term premium to be effective (unconventional and operation ‘twist’ type policies), would increase lending by 1-3/4% on average.
- Finally, policies that influence the asset cycle and the demand-supply interaction are also important in influencing the lending share. A 5% rise in house prices, given an initial 50% share, would increase lending though this effect by 0.6%. The asset cycle would also likely affect the banks’ total assets. While this scale effect might also improve the absolute size of loans, a 5% rise in house prices (and likely correlated with other asset prices) would flow through directly to the value of ‘other assets’ in the banks’ portfolio at a faster rate—securities values would rise more quickly than loans.

Figure 4: DTD and Lending from Banks in the Region Shown



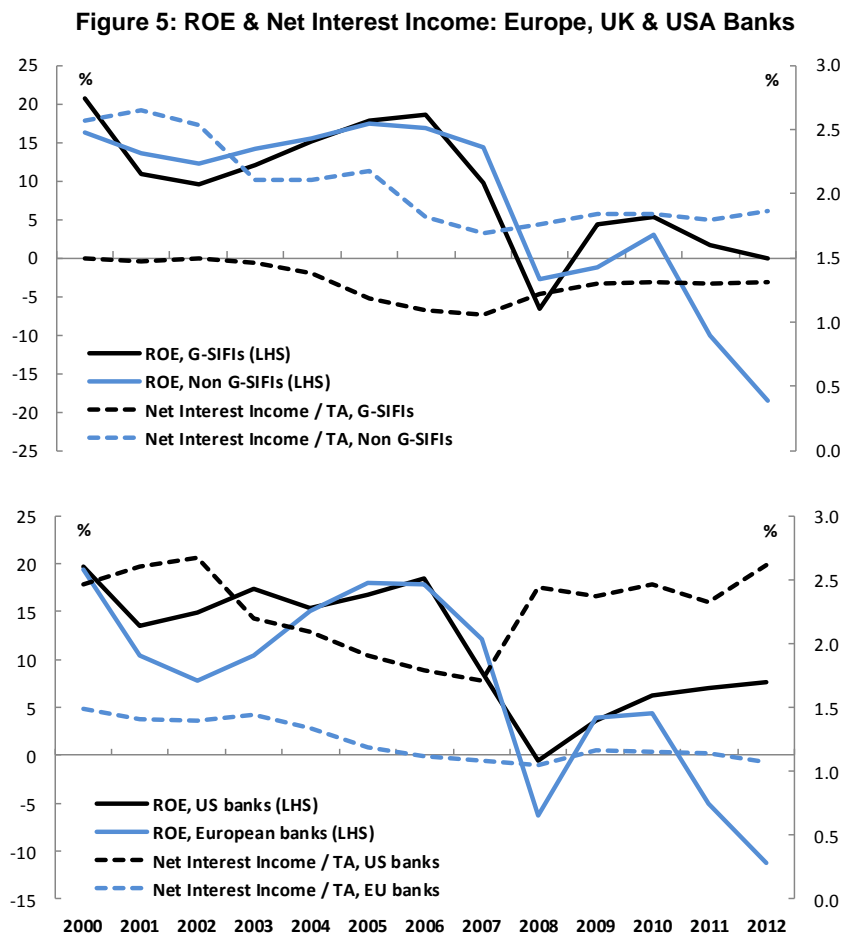
Source: Bloomberg, bank balance sheets and OECD. Weighted DTD is calculated for the 69 largest publicly traded commercial banks in the USA and in Europe with total assets that exceed \$50bn.

V. Explaining Current Bank Lending Puzzles

GSIFI versus traditional banks

GSIFI banks appear to be largely unaffected by lending spreads, and the only term of significance is the ratio of RWA to TA. In the above model, the two interest rate spread terms were very important as key determinants of the incentive to lend for non-GSIFI banks. The net interest income as a share of total assets of banks from the USA, Europe and the UK and traditional banks is shown on the right-hand scale of

Figure 5, and the return on equity (ROE) is shown on the left scale. The first panel shows the cases for GSIFI and non-GSIFI banks.



Source: Bloomberg, OECD. These figures are calculated for a sample of 593 global banks in the USA (485) and Europe and the UK (108). The sample consists of 27 G-SIFIs (the 21 G-SIFIs as defined by the FSB (2011) and 6 banks that failed in the crisis that started in 2007, but which can be considered as G-SIFIs, such as HBOS, Merrill Lynch, Lehman Brothers, Washington Mutual, Wachovia and Bear Stearns) and 566 other banks.

The net interest income of GSIFI banks fell from around 1.5% in 2000, to 1% during the crisis year of 2008, recovering to 1.3% by 2011, a 20 basis point fall overall. As total operating costs of these banks typically lie in the 2-3% of assets range, this decline put pressure on the banks other sources of income to make ends meet. Fortunately for them, the GSIFI banks depend less on net interest income for profitability, and have benefited from policies that led to a general rally in markets affecting their securities business in the past couple of years.

For the traditional banks, net interest income fell from 2.6% in 2000 to 1.7% in the crisis, and it has not yet recovered. These banks depend more on net interest income and, as competition drove this ratio down, their profits suffered more once their gain-on-sale income deriving mainly from their dealings with GSIFI banks dried up during the crisis. Their ROE fell from 16.3% in 2000, to -3% in 2008, apparently recovered moderately, and then collapsed to -10% in 2011 as the asset write-off process continued.

Misaligned incentives result in losses and unprofitable business models post the crisis

Misaligned regulatory incentives were present for traditional banks in equal measure to those discussed earlier for GSIFI's: they could sell newly-originated loans (typically mortgages) into SPV's and into the warehousing by investment banks for future securitisation, hence moving the assets off their balance sheets. Alternatively, these banks could securitise loans, buy a credit default swap, obtain a good credit rating, and thereby lower the capital requirements if securities were held on the balance sheet. While the 'music was playing' traditional banks could profitably pay a higher price on mortgages (i.e. accept a lower yield) than the originators ultimately could accommodate within their cost structure. The regulatory savings were shared between the bank as the originator and their borrowers. The lower mortgage rates attracted more borrowers, and the "gain-on-sale" of mortgage assets sold into securitization at first more than replaced the lost operating income, driving up the profitability of banks and mortgage institutions as long as the process could continue. Competition between banks in this process forced the adoption of similar business models, which magnified its systemic significance. From 10-12% in the recession of 2001, ROE's rose to around 18.5% in 2006 for both bank groups, but then fell into negative territory in 2008. Subsequently, by 2011, the GSIFI average ROE moved into positive territory, despite massive write-offs (particularly in the USA), whereas the traditional banks collapsed into even worse negative numbers. This difference has likely amplified further with the rally in markets in 2012.

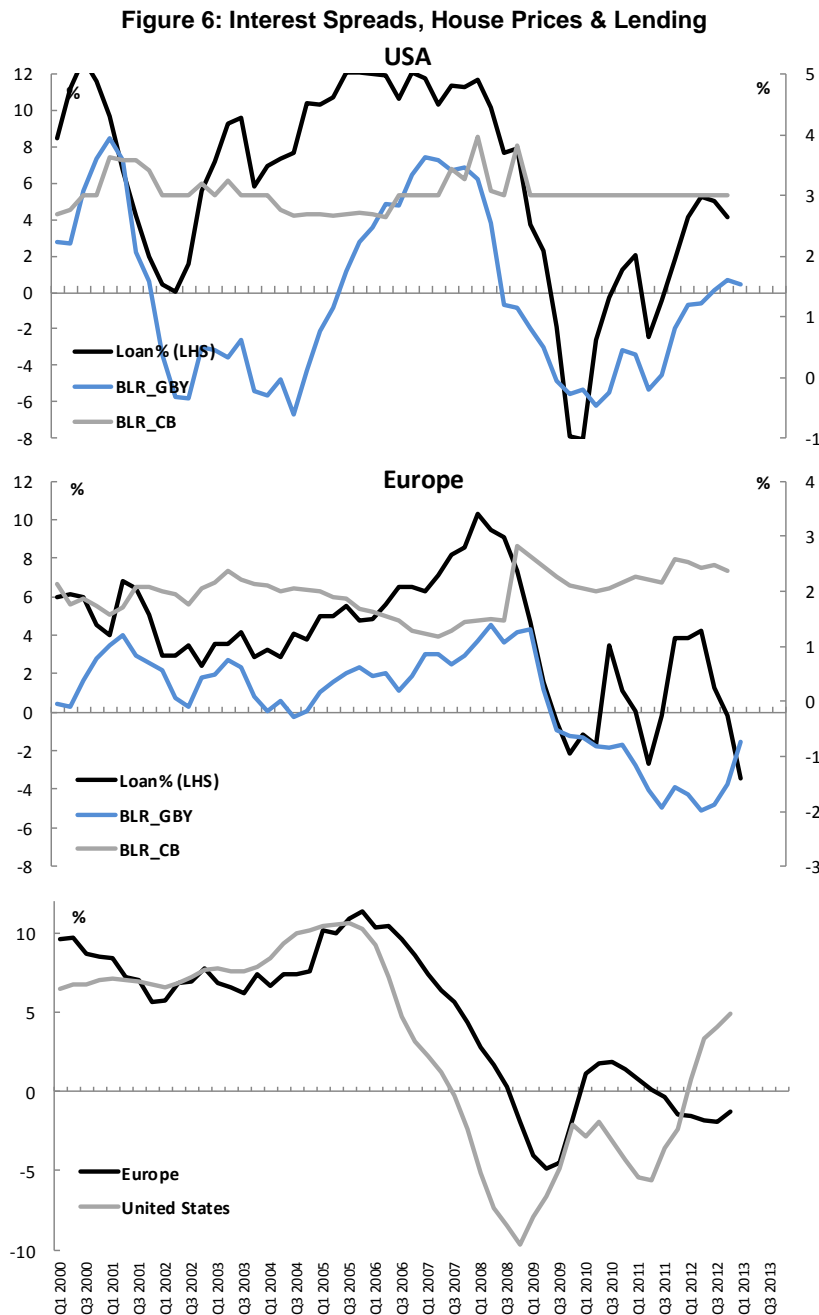
For more traditional banks, while the return on equity was high prior to the crisis, operating spreads fell via competition for loans, which brought in more marginal borrowers and allowed house prices in many regions to become overvalued. Any halt to the growth of securitisation would leave banks with loans (at too low a spread) that were unprofitable leaving many with substandard assets to deal with and negative operating income (without the gain-on-sale business). This has left them in a poor position to write off bad loans and/or to rebuild capital.

Europe versus the USA

This problem of loss of gain-on-sale revenue has been particularly bad in Europe, and is very much a part of the problem that plagues, for example, the *cajas* in Spain and many other small and medium-sized banks. Currently, loans of the US banks analysed in this study grew by 3.75% over 2012, while in Europe it is fell on average by -0.5%, a difference of 4.21%. The second panel of Figure 5 shows the breakdown for the USA and European banks' net interest income and ROE's. It is quite striking that US monetary policy and the state of competition in banking has led to a sharp recovery in net interest income back to around 2.3% of assets, while European banks' remains stuck at 1.3% of assets in 2011. On average, US interest margins are back closer to covering their typically higher cost base than is the case in Europe and, depending where they are in the writing-off of bad loans, are in a better position to be lending. The main reasons for this difference in lending, according to the model, can be seen from the macro policy variables shown in Figure 6:

- Over the past year the prime rate-cash rate spread in the first panel has averaged 300 basis points in the USA, versus 238 in Europe, a 62 point difference. According to the model, this is worth around 1.5% of the difference in lending between the two regions.
- The prime rate spread to government bonds has averaged a positive 145 basis points for the USA over 2012 and -40 basis points for Europe. This difference of 185 basis points is worth 3.3% difference in lending according to the model.
- House prices averaged 3.2% growth in the USA in 2012, versus -1.64% in Europe. This difference of almost 5% is worth 0.6% difference in lending according to the model.

These terms account for a lending difference of 5.4% pa, more than sufficient to explain the observed gap in lending.



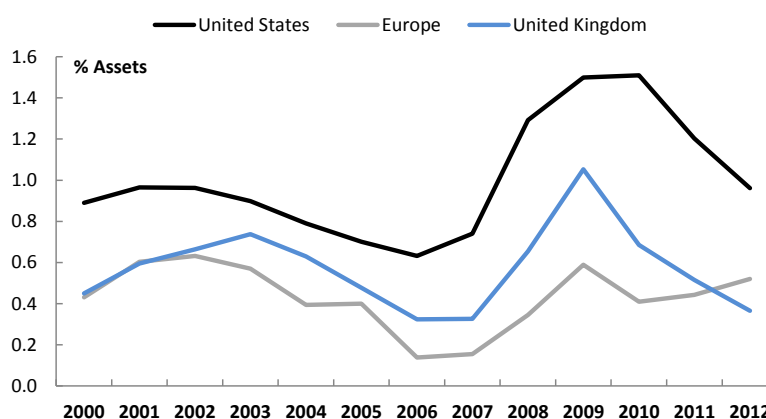
Source: OECD. Datastream.

However, it is also necessary to examine where banks are in terms of the writing off of bad loans. Here, there are some differences in accounting procedures for loss provisions between the US and Europe. These differences would normally bias the US to reporting more loan losses, as there is a more forward looking aspect in the US rules¹². The US banks covered in this study have much higher loan loss provisions than do European banks (see Figure 7), and the most likely reason is the under-reporting of loan problems to prevent it from flowing through to the income statement and to executive bonuses. This is symptomatic of lack of transparency and under-reporting of losses by European banks, which would

normally require some form of regulatory forbearance on the part of supervisors. This point, along with the relatively poor capitalisation of European banks, is underlined by the fact that the asset-weighted average DTD for Europe over the past year was a low 1.7 standard deviations, compared to a somewhat safer 2.6 standard deviations for the USA. The bottom panel of Figure 4 shows how the weighted average DTD led the lending cycle down as the crisis approached in the USA, Europe and the UK. Subsequently, the US DTD has risen more quickly than in Europe, and at the end of 2012 was at a level similar to that which prevailed in the 1990's.

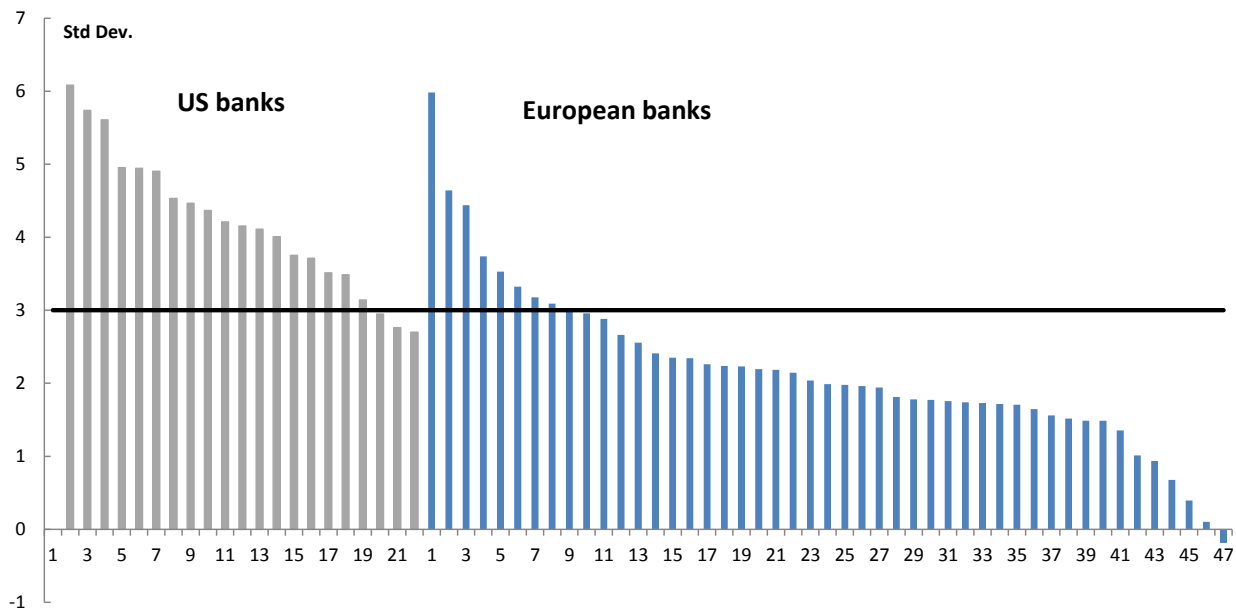
The greater safety of US banks is due to the transparent and direct approach the USA took from the outset: (i) its banks wrote off more bad loans early on; and (ii) the authorities injected large amounts of capital forcibly into banks (good deleveraging). In Europe, under reporting of loan losses, possible regulatory forbearance and the failure to inject sufficient capital into banks at the outset of the crisis are likely to be important influences on poor lending¹³. Provisions for loan loss was around 1.2% of assets for the USA in 2011, versus Only 0.4% in Europe. The LLP_TA term in the above model would reduce lending in the US relative to Europe by roughly -0.5%, but this is largely offset by the lower DTD in Europe. As the markets monitor developments in the financial sector, much of the information concerning poor reporting in Europe is discounted in share price action, which enters the DTD calculation.

Figure 7: Loan Loss Provisioning USA, Europe and the UK



Source: Bloomberg, OECD. These figures are calculated for a sample of 593 global banks in the USA (485) and Europe and the UK (108).

Figure 8 shows the DTD for the 69 banks (numbered but not identified) chosen for the above model. In the United States 19 of the 22 banks are safely above 3 standard deviations (a standard deviation of 2 implies a 5% chance of default, which is too high for the global financial system). In the case of Europe, no less than 39 banks are at a DTD of 3 standard deviations or below. These banks require recapitalisation and a more rapid treatment of potential loan losses.

Figure 8: The Distance to Default Distribution: US versus Europe 2012

Source: Bloomberg, OECD. This figures show the estimated DTD in 2012 of each 69 largest publicly traded commercial banks in the USA and in Europe with total assets that exceed \$50bn.

VI. Some Concluding Remarks on Policy

Macro policy

The above results suggest while easy monetary policy can improve the bank lending rate to cash rate spread, only the US unconventional monetary policy has succeeded in making bank lending relatively much more attractive for a bank than owning government bonds in its portfolio. The euro crisis, the shortage of bank capital (favouring zero risk-weight securities) and the assumption that sovereign bonds are implicitly guaranteed, makes bond yields too attractive for European banks. The results suggest that the ECB could do much more if it wanted to get lending moving again by large scale policies to compress the term premium on sovereign bonds in much the same that the US has done.

However, there may be a fundamental problem with this type of monetary policy, nevertheless, when considered against the structure of the banking system. This is because unprecedented monetary ease is aimed at more risk taking and ‘pumping up’ asset prices (house prices, equities and high-yield debt). Deleveraging at first sight appears to have returned to late 1990’s and early 2000’s levels (Figure 1); but while lending has been hurt in recent years, the main part of deleveraging has been achieved mainly by falling values of ‘other assets’ (Figure 2). In the US, ‘other assets’ are already rising more quickly than loans, and if this continues for too long, leverage could be returned to the high levels just prior to the crisis. This would leave the structure of the financial system much like it was before the crisis, increasing its vulnerability to a future risk event. This suggests that if some of the monetary support were to be withdrawn, other policies to help lending by structural policy changes should be considered.

Regulatory policy

The above results for GSIFI banks suggest that only one factor would be significant in changing their lending behaviour: raising the ratio of RWA to TA. If this ratio were raised to a minimum of 50% from a starting point of 20%, it would raise the lending by that institution by 15% (starting from a loan portfolio

share of 30%). This policy would require a change to the Basel rules, which have nothing to say about this ratio at present—an oversight that permits the risk-weight optimisation problem discussed earlier. This policy is less relevant for non-GSIFI banks.

These observations raise the question as to why GSIFI banks should not then be separated into securities and traditional banking components—as the latter would automatically have a higher RWA_TA ratio anyway, and would certainly be more responsive to interest rate policies.

Supervision and accounting

There is clearly a payoff for lending behaviour in policies that make traditional banks safer in terms of the DTD. This is not the case for GSIFI banks. The difference undoubtedly relates to the TBTF issue. GSIFI banks not separated into their component parts, with each business line firewalled against the other (to prevent the creditors of one subsidiary pursuing those of another), will not be resolved, so they have no incentive to follow policy signals and instead focus on taking more (under-priced) risks related to the value of securities. Smaller banks can be resolved, and there is a payoff for lending behaviour by making them safer. This again seems to make separation policies an attractive option.

The earlier discussion also suggests that it does not help to allow un-transparent accounting and the hiding of potential loan losses, which appears to affect European banks in particular. The market price of equities will adjust anyway, reducing the DTD, and this may lead to herd behaviour and liquidity problems, with markets wild with rumour about the state of the bank's solvency. This suggests that GAAP and IFRS accounting differences on loan loss provisioning need to be resolved quickly, in favour of more forward looking behaviour for banks.

Bank separation

Table 4 sets out the main business model features of the GSIFI and traditional banks alongside some of the determinants of lending. The banks in each case are arranged by the loan-to-total-asset ratio (LO_TA) in the left hand column in each case: the 10% of banks that are the smallest lenders by share of portfolio, the next 2 groups of 12.5% of banks, the next group of 32.5% of banks, a group of 22.5% and finally the 10% of banks that are the largest lenders.

If an additional aim of bank separation policy was to encourage banks to lend at least 50% of their balance sheet, in addition to financial fragility reasons for separation considered in an earlier paper¹⁴, then:

For the GSIFI banks:

- In this sample 79% of the GSIFI banks (the midpoint of the 5th panel) would certainly have to be split to be consistent with this, (i.e. some 22 of the 28 banks considered). That is, split so that more banks with a naturally high lending share that are more responsive to monetary policy would be created.
- GSIFI banks which, if not separated, would still lend above 50% of their balance sheet, would be those with less than 29% of their portfolio in trading securities (the median value in this 5th group), and less than 10% in derivatives.

For the traditional banks:

- Some of the banks in the first 10% group of traditional banks might also be considered for separation, about 44 of the 440 banks.

- While all of these traditional banks do not deal in derivatives on any relevant scale, it appears that only banks with less than 29% of their assets in trading securities (the median of the second panel) would seem to be consistent with lending above 50% of their balance sheet.

However, the risk of bank failure remains the key reason for separating banks and the study cited earlier suggested that derivatives, leverage and wholesale funding were the key negative influences on the DTD, while trading securities have a positive influence. Separating most of the GSIFI banks and a few of the traditional banks that are securities focused would have the added benefit of encouraging a greater propensity to lend. The creation of more banks that are simultaneously safer, more focused on lending, more responsive to monetary policy, and not excessively focused on asset price speculation strategies, would be a welcome structural change, improving both trust and the functioning of the financial sector.

Table 4: Bank Lending and Business Model Features

| G-SIFIs | | | | | | Non G-SIFIs | | | | |
|-------------|-------------|------------|-------------|-------------|-------------|-------------|------------|-------------|-------------|------------|
| | LO_TA | LLP_TA | RWA_TA | TD_TA | GMV_TA | LO_TA | LLP_TA | RWA_TA | TD_TA | GMV_TA |
| Min - 10% | | | | | | | | | | |
| Mean | 0.3 | 4.3 | 23.6 | 44.2 | 39.5 | 41.3 | 3.5 | 53.8 | 39.8 | 1.5 |
| Median | 0.0 | 4.3 | 19.1 | 33.6 | 44.4 | 45.1 | 2.7 | 51.2 | 39.4 | 0.0 |
| Max | 5.3 | 4.7 | 39.6 | 90.9 | 74.8 | 52.4 | 43.1 | 122.4 | 76.0 | 33.6 |
| Min | 0.0 | 3.8 | 14.3 | 10.9 | 0.1 | 2.0 | -33.6 | 8.6 | 0.8 | 0.0 |
| Std Dev. | 1.2 | 0.7 | 9.5 | 26.3 | 26.8 | 11.6 | 5.1 | 44.4 | 12.0 | 3.9 |
| 10% - 22.5% | | | | | | | | | | |
| Mean | 7.2 | 5.4 | 36.9 | 58.4 | 31.2 | 57.4 | 2.7 | 60.4 | 28.6 | 0.7 |
| Median | 6.8 | 4.1 | 36.3 | 59.3 | 30.0 | 57.8 | 2.4 | 59.4 | 29.7 | 0.0 |
| Max | 11.1 | 11.2 | 44.9 | 61.1 | 85.2 | 60.8 | 15.1 | 163.2 | 43.2 | 16.2 |
| Min | 4.6 | 1.0 | 25.2 | 52.4 | 4.0 | 52.5 | -0.9 | 18.1 | 0.3 | 0.0 |
| Std Dev. | 2.1 | 4.0 | 6.9 | 3.5 | 20.6 | 2.4 | 1.6 | 18.9 | 6.9 | 2.1 |
| 22.5% - 35% | | | | | | | | | | |
| Mean | 17.1 | 2.5 | 24.2 | 61.5 | 29.7 | 63.0 | 2.5 | 64.2 | 24.2 | 0.6 |
| Median | 16.8 | 1.1 | 22.0 | 70.2 | 25.2 | 63.0 | 2.2 | 63.2 | 24.9 | 0.0 |
| Max | 20.4 | 8.6 | 46.5 | 80.7 | 96.0 | 65.1 | 11.5 | 163.2 | 36.2 | 10.9 |
| Min | 13.5 | -0.4 | 13.1 | 18.9 | 7.6 | 60.8 | -1.9 | 19.5 | 0.3 | 0.0 |
| Std Dev. | 2.2 | 2.9 | 9.5 | 19.6 | 23.7 | 1.3 | 1.6 | 16.0 | 5.3 | 1.6 |
| 35% - 67.5% | | | | | | | | | | |
| Mean | 32.2 | 4.4 | 34.9 | 41.1 | 26.8 | 69.9 | 2.3 | 70.5 | 18.0 | 0.4 |
| Median | 33.1 | 3.1 | 33.1 | 46.7 | 22.4 | 70.0 | 1.9 | 65.4 | 18.2 | 0.0 |
| Max | 42.5 | 18.5 | 77.5 | 67.7 | 86.4 | 74.4 | 12.4 | 174.3 | 39.4 | 29.5 |
| Min | 20.8 | -0.2 | 15.7 | 3.7 | 4.4 | 65.1 | -1.5 | 23.1 | 0.0 | 0.0 |
| Std Dev. | 6.0 | 4.4 | 13.5 | 19.0 | 16.7 | 2.6 | 1.4 | 60.3 | 5.2 | 1.8 |
| 67.5% - 90% | | | | | | | | | | |
| Mean | 52.5 | 2.2 | 40.7 | 29.3 | 16.1 | 78.2 | 1.8 | 72.3 | 11.6 | 0.2 |
| Median | 54.0 | 1.5 | 36.8 | 29.5 | 10.6 | 77.9 | 1.6 | 70.0 | 11.6 | 0.0 |
| Max | 62.0 | 10.0 | 62.9 | 43.7 | 49.3 | 82.6 | 8.3 | 134.6 | 33.2 | 4.9 |
| Min | 42.6 | 0.3 | 13.9 | 13.9 | 1.6 | 74.4 | 0.0 | 42.8 | 0.2 | 0.0 |
| Std Dev. | 6.4 | 2.0 | 11.1 | 8.2 | 13.6 | 2.5 | 1.0 | 13.5 | 4.2 | 0.6 |
| 90% - Max | | | | | | | | | | |
| Mean | 65.4 | 2.3 | 55.6 | 19.8 | 6.6 | 86.0 | 1.4 | 75.2 | 6.6 | 0.2 |
| Median | 64.0 | 1.8 | 53.3 | 22.2 | 6.6 | 85.4 | 1.4 | 71.5 | 6.1 | 0.0 |
| Max | 73.2 | 5.7 | 80.6 | 27.3 | 14.0 | 94.0 | 8.5 | 183.8 | 19.9 | 1.7 |
| Min | 62.0 | 0.0 | 12.0 | 8.7 | 0.3 | 82.6 | -0.2 | 48.8 | 0.5 | 0.0 |
| Std Dev. | 3.6 | 1.6 | 20.7 | 6.4 | 3.8 | 2.6 | 1.1 | 33.7 | 3.1 | 0.3 |

Source: Bloomberg, SNL Financials, author's calculation. This table reports the average value from 2005 to 2011 of the ratio shown for a sample of 468 U.S and European publicly traded commercial banks and broker dealers. The sample consists of 27 G-SIFIs (the 21 G-SIFIs as defined by the FSB (2011) and 6 banks that failed in the crisis that started in 2007, but which can be considered as G-SIFIs, such as HBOS, Merrill Lynch, Lehman Brothers, Washington Mutual, Wachovia and Bear Stearns) and 441 other banks. See Section IV for the definition of the variables.

Notes

1. Though some countries had housing booms, which did see rapid house price increases and strong mortgage lending.
2. This sample includes the largest publicly traded commercial banks in the USA and in Europe with total assets that exceed \$50bn. The GSIFI banks comprise 21 of the GSIFI banks in the USA and Europe, as officially defined by the FSB in November 2011 (excluding Asian banks and non-listed banks).
3. See Blundell-Wignall and Roulet (2012). The default point is where the market value of assets equals the book value of debt. See Appendix 1.
4. When an agent buys a derivative, another agent has to sell a derivative, normally requiring an opposite market view to the buyer, and/or a very different business objective.
5. Basel II permitted sophisticated banks to model the riskiness of their own portfolios to calculate risk-weighted assets (RWA) to which the capital rules were applied—an approach that continues under Basel III. By reducing the ratio of RWA to total assets banks are able to minimise the capital required to conduct their activities and hence to expand leverage. The change in SEC rules in 2004 allowed investment banks to be supervised on a consolidated entities basis, in place of the strict SEC limitations on leverage. This was equivalent to the regulatory minimum that US banks would need to operate in Europe. The huge problems with the move to Basel II were at the heart of the problem. See Blundell-Wignall, A., and P.E., Atkinson (2008); Blundell-Wignall, A., and P.E. Atkinson, (2010); Blundell-Wignall, A., and P.E. Atkinson, (2011); Blundell-Wignall, A., and P.E. Atkinson (2012); Blundell-Wignall, A., P.E. Atkinson and C. Roulet (2012) and Blundell-Wignall, A., and C. Roulet (2012).
6. Though not referencing the prior OECD work and commentary on this very issue in numerous publications since 2008, the BIS has started to look at risk-weight manipulation via modelling and to take it more seriously; see BCBS, (2013), “Regulatory Consistency Assessment Program (RCAP)”.
7. Losses incurred in the Lehman Brothers’ bankruptcy and in Greek debt restructuring may, in time, be seen as important positive steps in encouraging more prudent behavior in global financial markets.
8. These banks that failed in the crisis, but which can be considered as GSIFI’s are: HBOS, Merrill Lynch, Lehman Brothers, Washington Mutual, Wachovia and Bear Stearns.
9. See for example, Calza, A. M. Manrique and J. Sousa, (2003); Gambacorta, L and D. Marques-Ibanez, (2011).
10. From this perspective, a simple Granger causality idea helps to mitigate potential endogeneity issues.
11. See Blundell-Wignall and Roulet (2012), *op.cit.*
12. See Financial Stability Board, (2009), “Report of the FSF Working Group on Provisioning”. Under GAAP, banks are required to disclose an accrual to income for estimated credit losses, provided 2 conditions are met: (1) is it probable that an asset has been impaired; and if so (2) can it be estimated. IFRS reports only actual loan events.
13. As argued in Blundell-Wignall and Atkinson (2012), *op.cit.*
14. Blundell-Wignall and Roulet (2012), *op.cit.*

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APPENDIX 1: DISTANCE-TO-DEFAULT

The distance-to-default indicator DTD_t is the number of standard deviations away from the default point. To derive the measure, it is assumed that a bank defaults (or is bankrupt) when the market value of assets equals (or is lower) than the book value of debt ($V_t = D_t$). The formula to calculate the distance-to-default is derived from the option pricing model of Black and Scholes (1973) and is as follows:

$$DTD_t = \frac{\log\left(\frac{V_t}{D_t}\right) + \left(r_f - \frac{\sigma_t^2}{2}\right) \cdot T}{\sigma_t \sqrt{T}}$$

where:

V_t : Market value of bank's asset at time t ,

r_f : Risk-free interest rate,

D_t : Book value of the debt at time t ,

σ_t : Volatility of bank's asset at time t ,

T : Maturity of the debt.

However, the market value of assets (V_t) and its volatility (σ_t) have to be estimated. Equity-holders have the residual claim on a firm's assets and have limited liability. As first realised by Merton (1977), equity can be modelled as a call option on the underlying assets of the bank, with a strike price equal to the total book value of the bank's debt. Thus, option-pricing theory can be used to derive the market value and volatility of bank's underlying assets from equity's market value (VE) and volatility (σ_E), by solving:

$$V_t = \frac{VE_t + D_t e^{-r_f T} N(d2)}{N(d1)}$$

$$\sigma_t = \frac{VE_t}{V_t} \frac{\sigma_{E,t}}{N(d1)}$$

where:

$$d1 = \frac{\log\left(\frac{V_t}{D_t}\right) + \left(r_f + \frac{\sigma_t^2}{2}\right) \cdot T}{\sigma_t \sqrt{T}}$$

$$d2 = d1 - \sigma_t \sqrt{T}$$

VE : Value of bank's equity,

N : The cumulative normal distribution,

σ_E : Equity's volatility.

A bank defaults (or is bankrupt) when DTD_t equals to 0 (or is negative). All data are extracted from Bloomberg. The total annual debt liabilities, (i.e. annual total assets minus annual total equity), is interpolated using a cubic spline to yield daily observations (D_t). The volatility of equity (σ_E) is the standard deviation of daily return multiplied by $\sqrt{252}$ (i.e., 252 trading days by year). The expiry date of the option (T) equals the maturity of the debt. A common assumption is to set it to 1. The risk free interest rate (r_f) is the 12 months interbank rate.