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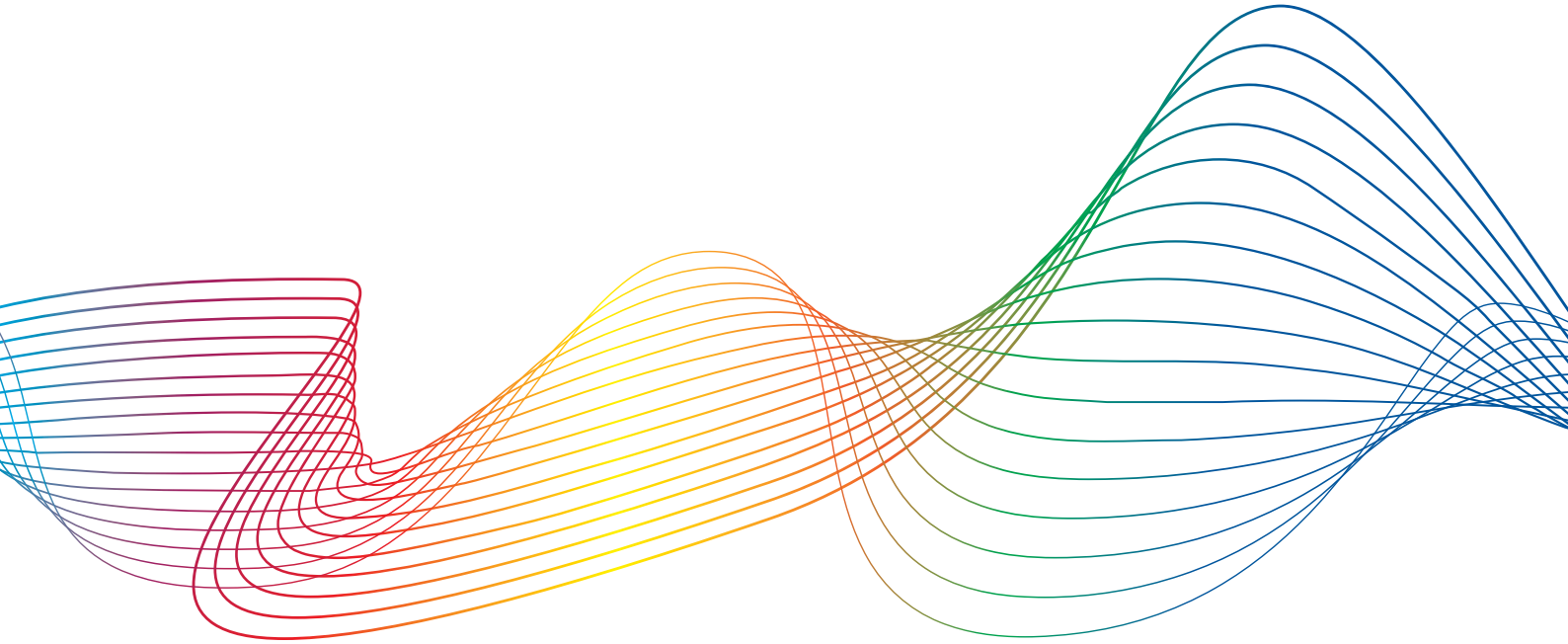
Is Europe Overbanked?



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Introduction

This paper is after a difficult question: has banking grown too much in Europe? The difficultly of the question lies in the words "too much", which require a normative answer. We must take a stance on how much is "too much", based on the needs of the real economy in Europe.

To tackle the question, we take an approach similar to that of a doctor treating a patient who seems overweight. The doctor's first step is *anamnesis*: to collect information about the patient's current and past weight and their medical history; and to benchmark these data against those of other people. Likewise, in Section 1 we review basic facts about the banking system in Europe, including its size, recent growth, concentration and leverage, and compare these data with those of other banking systems. According to all indicators, our patient is abnormally heavy.

The doctor must then make a *diagnosis*: as to whether the patient has gained "too much" weight, in the sense of weight gain leading to problems such as high blood pressure, sleep and breathing difficulties, and so on. Similarly, in Section 2 we explore whether the European banking system has expanded beyond the point where it makes positive contributions (at the margin) to the real economy. Specifically, we investigate whether banks' recent expansion is associated with (i) lower and more volatile economic growth; and (ii) excessive risk-taking and more frequent financial crises, including banking and sovereign debt crises.

At this point, the doctor considers *why* the patient has gained so much weight, i.e. turns to *etiology*: is it eating disorders, a sedentary lifestyle, or a disease? This question is asked not just out of curiosity, but because these causes entail different prognoses regarding the future of the patient's health and different therapies. Similarly, Europe's overbanking problem reflects various causes (described in Section 3): (i) government support and inadequate prudential supervision have exacerbated banks' moral hazard problems; (ii) politicians in some countries have encouraged such expansion, for instance to promote "national champions" or to stimulate employment growth for electoral reasons; and (iii) the cost mix of European banks may have induced banks to overextend their market presence.

Finally, after gathering and evaluating all the evidence, the doctor prescribes *therapies* for the sorry patient. The objective of therapy is to address the root causes of the illness; alleviate nasty symptoms; and avoid unintended side-effects. Likewise, in Section 4, we outline possible policies to address overbanking in Europe.

We are not the first doctors that the European banking system has consulted in recent years. Our patient has just taken a potent medicine (the CRD IV package) and has prescriptions for more (BRRD, SSM, SRM, and possibly structural reform).[1] Indeed, our patient has grown tired of this medicinal onslaught: he has "therapy fatigue". But, in our view, more is needed. Some therapies could have a higher dosage; others have not been tried at all. We think that a course of new treatments will brighten the prognosis: helping the European banking system to make a speedy and lasting recovery from its current bloated state.

[1] These "medicines" refer to EU legislation on capital requirements (implementing the Basel III standards); the directive on bank recovery and resolution; the single supervisory mechanism; and proposals for a single resolution mechanism and structural reform of the banking sector. Section 4 provides more details.

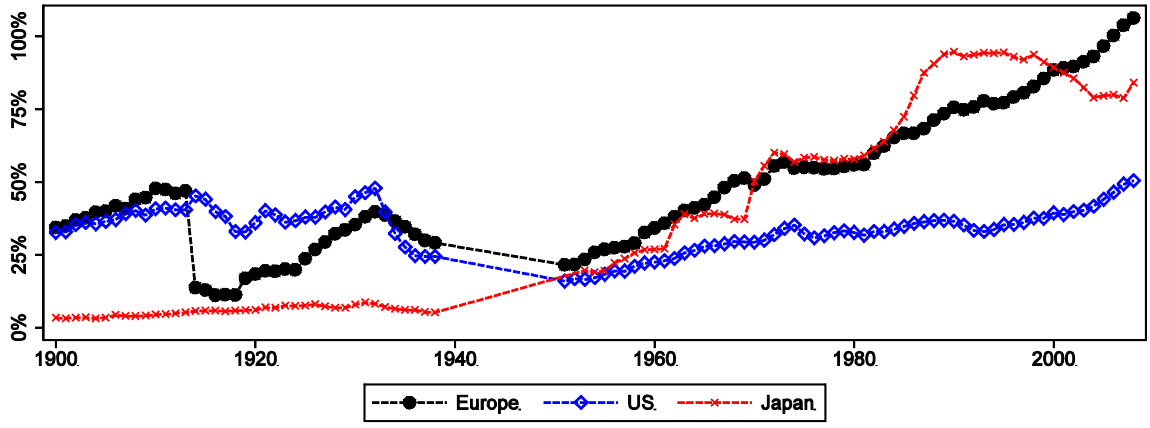
Section 1: *Anamnesis*: The Basic Facts

Over the past 15 years, the EU's banking sector has undergone radical transformations. The sector has ballooned in size: banks have greatly increased the supply of private credit, and expanded into new lines of business. Growth has been concentrated in the largest banks, which have also become more leveraged. This section documents these basic facts.

Part A: Banking system size

For most of the twentieth century, the volume of credit intermediation by banks relative to national output was stationary. In western Europe and the US, bank loans to the domestic private sector (as a proportion of domestic GDP) fluctuated around 40% from 1900 until about 1980 (Figure 1). Since then, the ratio of domestic bank loans to GDP has trended upwards. Statistical analysis shows that Europe's upward trend accelerated in the late 1990s, widening the gap between Europe and the US.

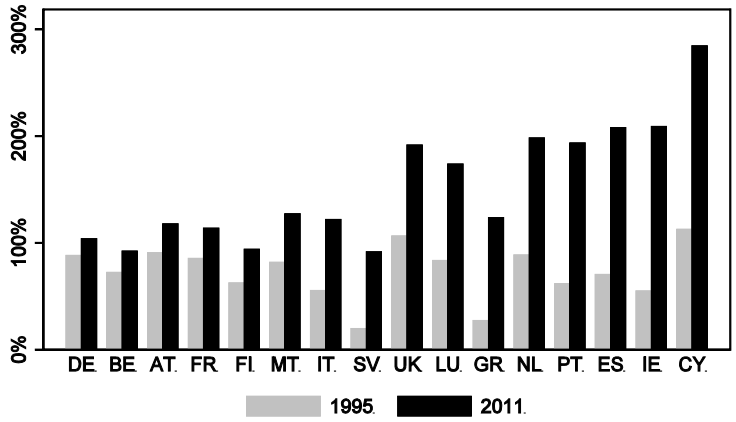
Figure 1: Bank loans to GDP in US, Japan, and Europe



Source: Schularick and Taylor (2012). Notes: Bank loans refers to resident banks' loans to the domestic private sector (households and non-financial corporations). The data therefore exclude foreign (and foreign currency) loans; and loans to the financial and public sectors. Europe represents an average (weighted by GDP) of DK, DE, ES, FR, IT, NL, SE and the UK.

Bank credit-to-GDP has increased everywhere in Europe, but the extent of the increase varies (Figure 2). Four EU countries (Finland, Germany, France and Austria) experienced only modest increases in credit to GDP over 1991-2011. Elsewhere, bank credit grew very substantially relative to GDP: in nine countries, the ratio more than doubled. Five countries where bank credit grew most substantially – Cyprus, Ireland, Spain, Portugal and Greece – received various forms of EU assistance over 2010-14.

Figure 2: Bank loans to GDP (%) in selected EU countries

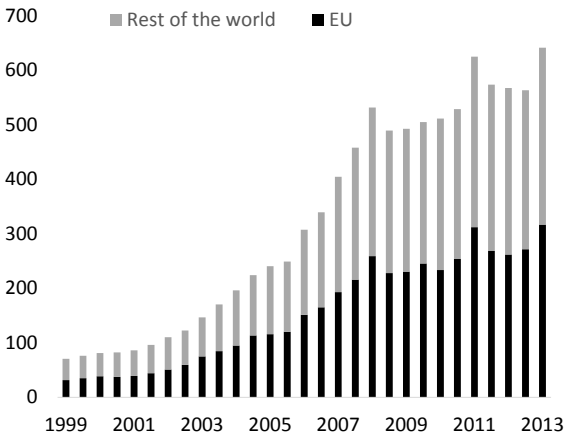


Source: World Bank Financial Development and Structure Dataset. Notes: Bank loans includes private credit by deposit money banks. This series includes intra-financial sector loans, unlike that of Schularick and Taylor (2012), and therefore levels are somewhat higher.

On top of this rapid growth in domestic private credit, European banks have expanded into other business lines, including securities and derivatives trading and lending to foreign entities.

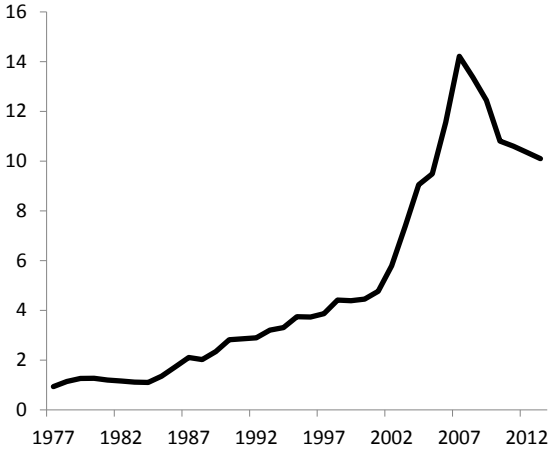
The growth of derivatives is a global phenomenon, but it has been more pronounced in

Figure 3: Derivatives by region (notional; US$tn)



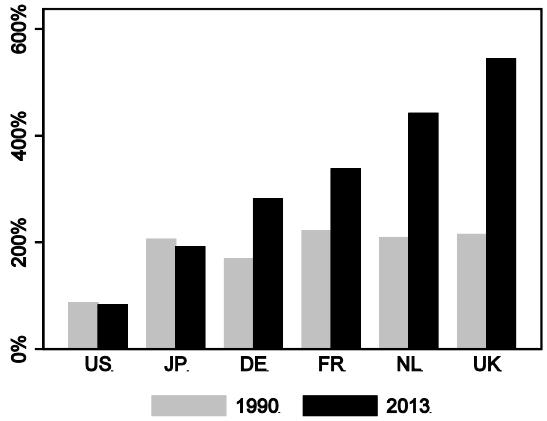
Source: BIS. Notes: The chart shows notional amounts outstanding of the main OTC derivatives (rates, FX, equities). Here, a derivative is considered "European" if it is referenced on an EU currency or entity.

Figure 4: Euro area banks' foreign claims (2013 dollars; US$tn)



Source: BIS (locational statistics, unconsolidated). Notes: Foreign claims consists of claims of euro area banks to the rest of the world including other euro area countries.

Figure 5: Resident banks' assets as % of domestic GDP



Source: Helgi Library; OECD; national central banks. The US observation in 2013 would increase by 32 percentage points including Fannie and Freddie and by a further 30 percentage points under IFRS-equivalent accounting.

Europe. The sum of gross notional amounts outstanding of OTC derivatives referenced on Europe's main currencies (in the case of foreign exchange and single-currency interest rate derivatives) and European entities (in the case of equity derivatives) approximately equals the rest of the world combined (Figure 3).

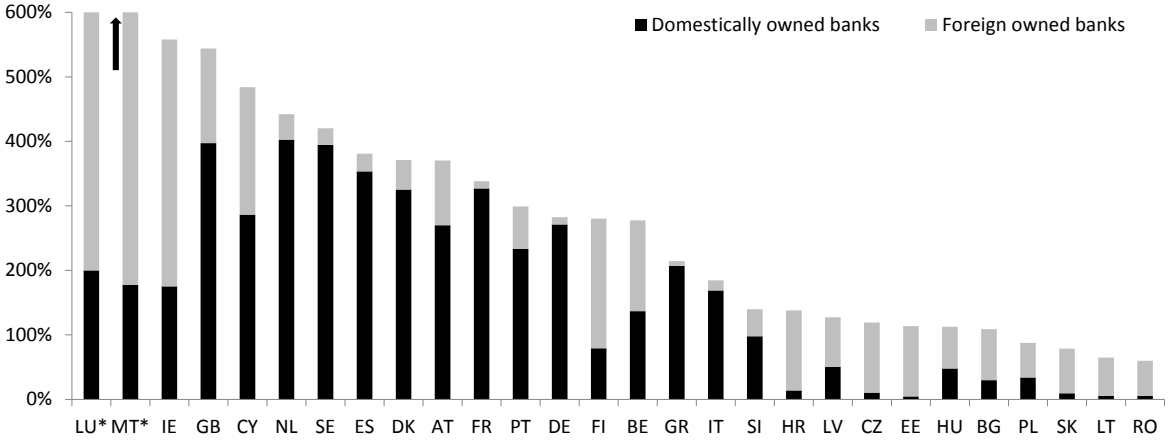
European banks have also expanded their foreign lending, with a notable acceleration at the end of the 1990s (Figure 4) – coincident with the acceleration in the growth of domestic credit and derivatives contracts. Since 2008, these trends have reversed to some degree – but not enough to compensate for previous increases.

As a result of these and other phenomena, EU banks' balance sheets have grown rapidly since the 1990s (Figure 5). In total, the total assets of the EU banking sector amounted to 274% of GDP in 2013, or 334% of GDP including foreign-owned subsidiaries resident in the EU. In several EU countries, this ratio surpasses 400% (Figure 6). By contrast, Japanese banks' assets add up to 192% of GDP; US banks' assets add up to 83% of GDP. Using IFRS-equivalent accounting, the US figure would be about 30 percentage points higher; including the assets held by Fannie Mae and Freddie Mac would add another 32 percentage points. Even with these two additions, total bank assets to GDP in the US would be 145% – just half of the EU's tally.

Notwithstanding these important historical trends, the EU banking system has shrunk by about 10% in recent years. In 2013, the total consolidated assets of banks resident in the EU stood at €42tn (including foreign-owned banks) and €34tn (excluding foreign-owned banks), down from €45tn and €38tn in 2008. Much of this decrease has been concentrated in countries with the largest domestic banking systems, such as Germany, the Netherlands, Belgium and Ireland. Despite this nascent deleveraging, the European banking sector remains very large compared with international peers.

To some extent, the extraordinary rise in bank assets relative to GDP (shown in Figure 5) reflects the rise in household wealth relative to

Figure 6: Total consolidated assets of domestic and foreign owned banks / GDP (%) in 2013 H1



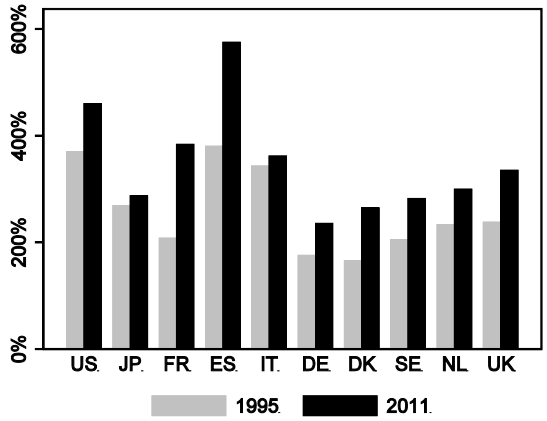
Sources: ECB consolidated banking data and the IMF World Economic Outlook. Notes: 2013 H1 refers to the first half of 2013. For presentational purposes the y-axis was truncated at 600%. The values for Luxembourg and Malta are 1719% and 798% respectively.

GDP over recent decades, as documented by Piketty and Zucman (2014) and Roine and Waldenström (2014), and summarised in Figure 7. Gennaioli, Shleifer and Vishny (2014) provide insights on the link between national wealth, national income and financial intermediation. In their model, financial intermediaries offer wealth preservation services to households. As such, the volume of financial activity changes in proportion to household wealth.

But to *what* extent does the increase in the size of the banking system relative to GDP simply reflect the increase in household wealth relative to GDP? Figure 8 provides some evidence, by scaling bank assets by household wealth rather than GDP. In the US, Japan and France, the ratio of bank assets to household wealth has indeed changed little (or even slightly decreased) over 1995-2011. But elsewhere in the EU this ratio has increased, in most cases substantially. Moreover, the level of bank assets to household wealth is generally much higher in the EU than in the US or Japan.

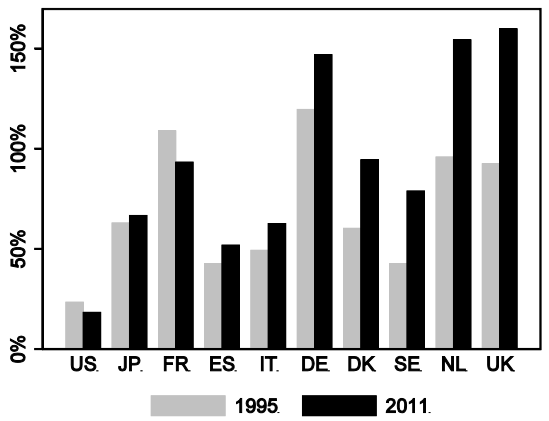
Hence, the model by Gennaioli, Shleifer and Vishny (2014) only helps to explain some of sharp increase in the ratio of bank assets to GDP since the 1990s. The model does not account for why the growth of bank assets has outpaced growth in household wealth in large parts of the EU. Possible explanations for the particularly fast increase of European banks' assets since the 1990s will be discussed in Section 3.

Figure 7: Net household wealth as a percentage of GDP



Source: OECD; national central banks; Roine and Waldenström (2014). Household wealth is the sum of financial and non-financial wealth (including housing) held by households, net of debt liabilities. Wealth data for Sweden are preliminary.

Figure 8: Resident banks' assets as a percentage of net household wealth

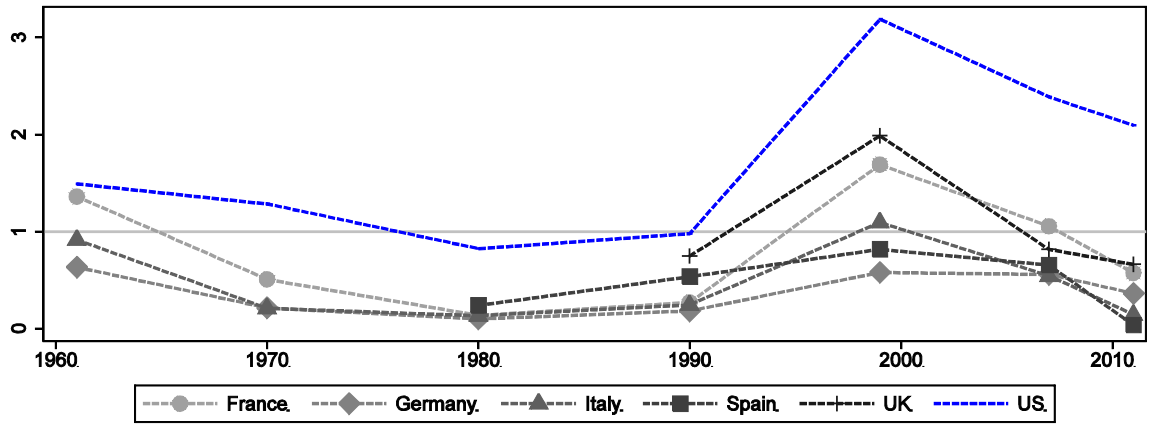


Sources: OECD; national central banks; Roine and Waldenström (2014); Helgi Library. Household wealth is the sum of financial and non-financial wealth (including housing) held by households, net of debt liabilities. Wealth data for Sweden are preliminary.

So Europe's banking system is large relative to the size of its economy, whether measured by income or household wealth. In itself, this might raise concerns (see Section 2, Part A). But Europe's banking system is also large relative to other sources of intermediation, such as bond and equity capital markets. To illustrate Europe's reliance on banks, Figure 9 measures "financial structure" as the ratio of stock market capitalisation to bank credit (to the private sector) in five EU countries and in the US.

Three important insights emerge from Figure 9. First, there is a common factor underpinning changes over time in financial structure: all countries became more market-based through the 1990s, and subsequently more bank-based over the 2000s. Second, the shift towards markets was more profound in the US in the 1990s. Third, the shift to banks was stronger in Europe over the 2000s. As a result, the transatlantic difference in financial structure is now much more pronounced than in 1990. All EU countries are clustered well below one in 2011 (Figure 9); the US, by contrast, has a ratio of stock market capitalisation to bank credit of around two.

Figure 9: Financial structure (measured as the ratio of stock market capitalisation to bank credit to the private sector)



Sources: Rajan and Zingales (2003); Schularick and Taylor (2012); and the World Bank. Notes: Financial structure is measured as the ratio of stock market capitalisation to bank credit (to the private sector). Special thanks to Luigi Zingales for sharing data.

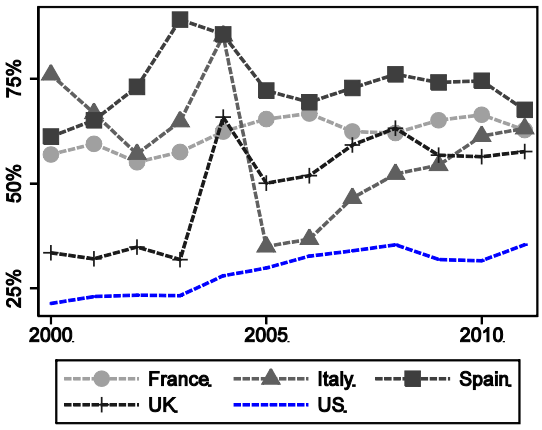
Part B: Banking system concentration

As the European banking system has become larger, it has also become more concentrated. Figure 10 shows that the proportion of a national banking system's total assets held by its largest three banks (the C3 ratio) has increased since 2000 in all major EU countries (except Italy). The UK shows the most marked increase. The US banking system has also become more concentrated, but from a much lower starting point in 2000.

In one sense, this comparison between EU countries and the US could be considered misleading, since the EU is a common market for banking services. The largest three banks in the EU together held assets of €7.3tn in 2012, or 21% of the total EU banking system – lower than in the US (35%). But comparing the EU-wide C3 ratio with the US's C3 ratio is also misleading, because banks just smaller than the top three are much bigger in the EU than in the US. The largest 20 banks in the EU in 2012 had total assets of US$23.7tn, compared with US$12.4tn in the US (or US$17.7tn under IFRS accounting).[2] Figure 11 illustrates this point: beyond the largest six banks, which account for about 90% of GDP in both the EU and US, the gap between the EU and US widens substantially.

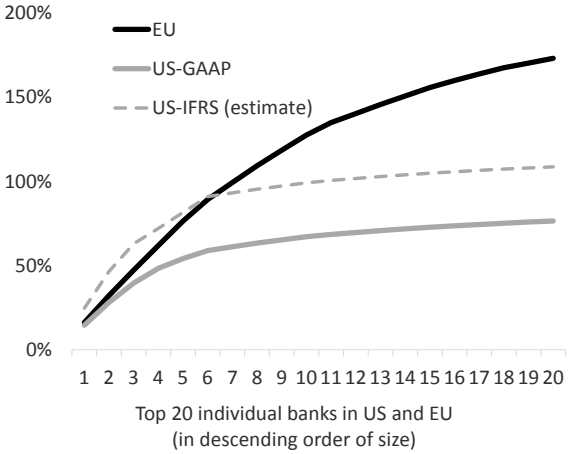
[2] Total assets based on GAAP standards are higher than IFRS, because GAAP permits netting of receivables and payables when a legally enforceable master netting agreement exists between two counterparties to a derivatives trade (ISDA (2012)).

Figure 10: Top three bank assets as % of total bank assets by country



Source: Bankscope; World Bank Financial Development and Structure Dataset.

Figure 11: Bank assets / regional GDP in 2012, cumulated over the top 20 banks (%)

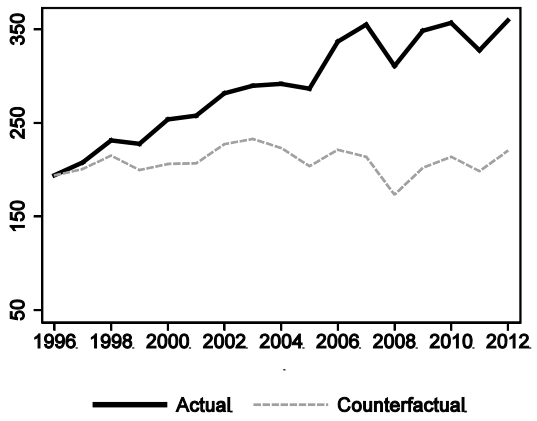


Source: Bloomberg; IMF.

To appreciate the importance of large banks, consider a thought experiment. If the largest 20 banks' assets had grown in line with nominal GDP since 1996 – and GDP growth had been the same – what would have been the size of the banking system in 2012? Strikingly, we find that the near-doubling in the size of the EU banking system (relative to GDP) since 1996 is entirely attributable to the growth of the largest 20 banks (Figure 12). This is also true of the US (Figure 13), but the magnitude of the effect is much smaller. The largest 20 banks in the US grew 61 percentage points relative to GDP over 1996-2012, compared with growth of 139 percentage points by the largest 20 EU banks.

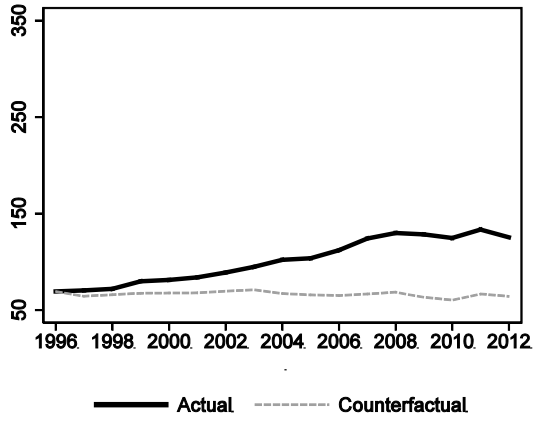
Figure 12 therefore reveals that the large size of the EU banking system and the size of the EU's largest banks are two related phenomena. In an important sense, these phenomena are two sides of the same coin. In order to understand the implications of overbanking in the EU, this report will therefore analyse both phenomena.

Figure 12: EU: Actual and "counterfactual" total banking system assets / GDP (%)



Source: Bloomberg; own calculations. Notes: "Actual" plots actual observations on the ratio of total banking-system assets to GDP. "Counterfactual" is the same, except that the assets of the largest 20 EU banks are assumed to grow in line with nominal GDP from 1996. The largest 20 EU banks are BNPP, BBVA, Santander, Barclays, Commerzbank, Danske, Deutsche, Dexia, HSBC, ING, Intesa, KBC, LBG, Natixis, RBS, SEB, Societé Génerale, Standard Chartered, Svenska Handelsbanken and UniCredit. The denominator is the sum of the nominal GDPs of the nine EU countries home to at least one top 20 bank (i.e. BE, DK, DE, ES, FR, IT, NL, SE and the UK).

Figure 13: US: Actual and "counterfactual" total banking system assets / GDP (%)



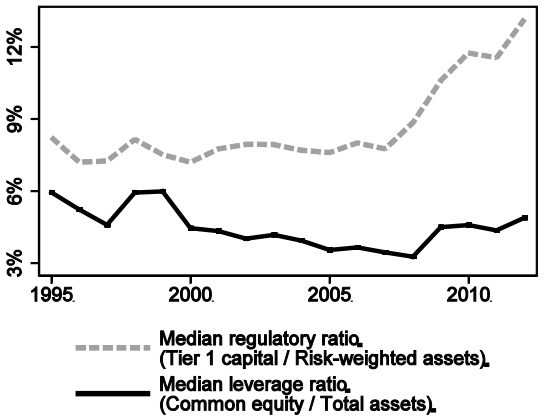
Source: Bloomberg; own calculations. Notes: "Actual" plots actual observations on the ratio of total banking-system assets (estimated using IFRS accounting standards) to GDP. "Counterfactual" plots these observations *as if* the assets of the top 20 US banks had grown in line with nominal US GDP from 1996. The top 20 US banks are BB&T, Bank of America, Bank of New York Mellon, Capital One, Citigroup, Fifth Third, Goldman Sachs, JPMorgan Chase, KeyCorp, M&T, Morgan Stanley, Northern Trust, PNC, Regions, SLM, State Street, SunTrust, US Bancorp, Washington Mutual and Wells Fargo.

Part C: Banking system leverage

Increases in banking system size and concentration were matched by greater leverage in the largest banks. In the late 1990s, the largest 20 listed banks in the EU had a median leverage ratio (defined as the book value of equity divided by the book value of total assets) of around 6%: at the median, assets were 17 times greater than equity (Figure 14). By 2008, the median of the largest 20 banks' leverage ratios had dropped to just over 3% (at the median, assets were 32 times equity).

All of the largest 20 listed EU banks participated in this leverage expansion before 2009. In the late 1990s, only a few of the largest 20 banks had leverage ratios below 4%; 10 years later, a minority had leverage ratios above 4%. Banks that in 2003 had leverage ratios above 8% – such as HSBC and BBVA – had by 2008 reduced their leverage ratios by around half. The two banks that began the decade with leverage ratios below 3% – Commerzbank and Dexia – finished the decade in receipt of equity from national taxpayers.

Figure 14: Book leverage ratio versus regulatory capital ratio (median of top 20 banks)

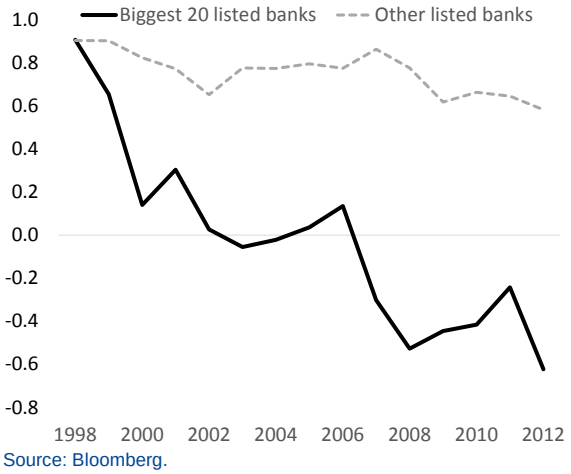


Source: Bloomberg. Note: The plotted lines show the median regulatory ratio and median leverage ratio in a balanced sample of the largest 20 EU banks.

While large banks' leverage ratios fell between 2000 and 2007, the regulatory ratio – Tier 1 capital to risk-weighted assets – remained relatively stable. The median Tier 1 capital ratio was around 8% in each year between 1997 and 2007 – a period over which the median leverage ratio fell by half (Figure 14).

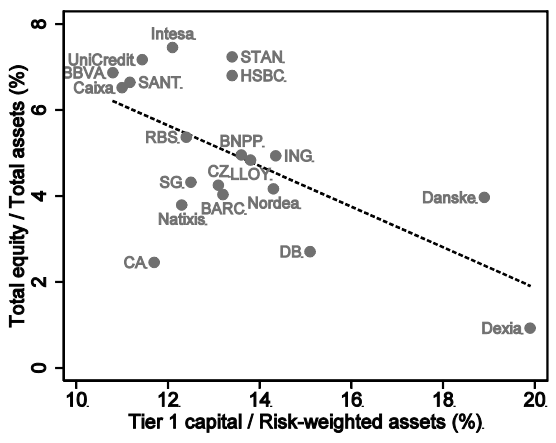
These insights reflect increasing divergence between book and regulatory measures of leverage. These two measures were highly correlated in the 1990s, as one would expect. But the correlation between them broke down in the early 2000s for the largest banks (Figure 15). By 2012, the correlation had turned strongly negative (Figure 16). Remarkably, a negative correlation implies that banks that were more capitalised according to the regulator had lower equity-to-asset ratios. The linear regression line shown in Figure 16 has a slope of -0.5, and is significant at the 1% level of confidence. This negative slope is significant even when excluding Dexia from the regression.

Figure 15: Correlation of E/TA and T1/RWA



Source: Bloomberg.

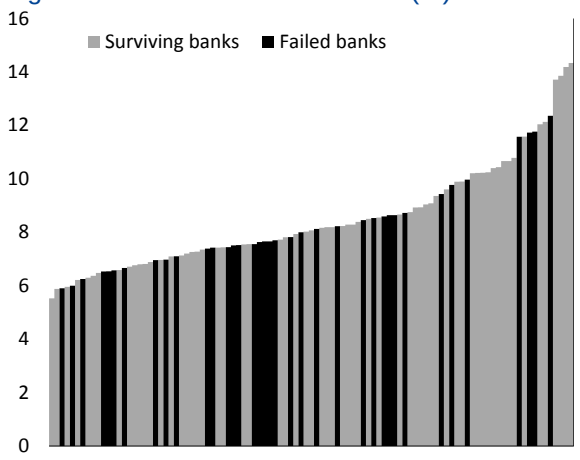
Figure 16: E/TA vs T1/RWA in 2012



Source: Bloomberg. The dashed line represents the estimated linear regression, which has a slope of -0.5 and is significant at the 1% level.

Large banks were thus able to increase their leverage – and therefore their return on equity (unadjusted for risk) – while complying with risk-based regulatory ratios. These large banks are more able to devise internal risk models to determine the risk weights to be applied to their assets (Beltratti and Paladino (2013)). Moreover, banks increasingly issued lower quality capital, widening the gap between common equity and broader Tier 1 capital (Boyson, Fahlenbrach and Stulz (2014)).

Figure 17: Global banks' T1/RWA (%) in 2006

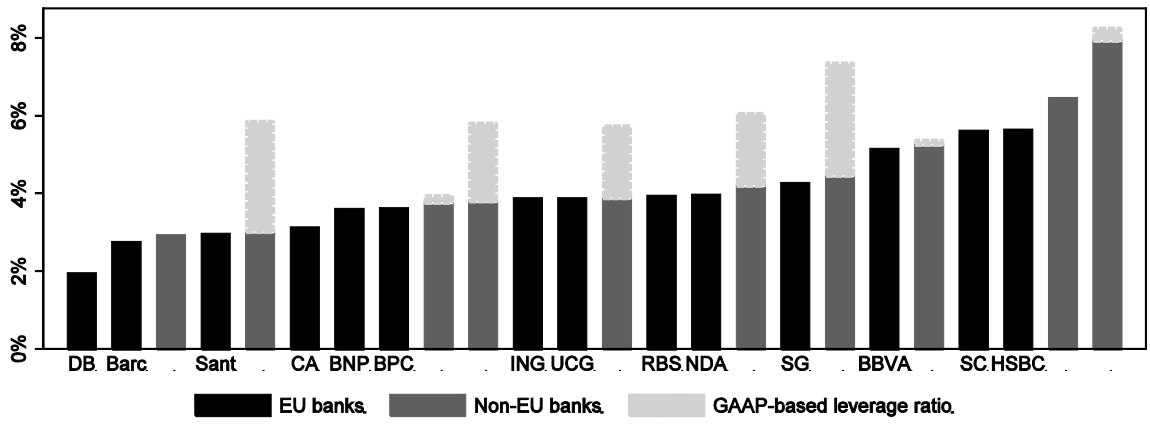


Source: Haldane and Madouros (2012), Capital IQ, SNL Financial, published accounts, Laeven and Valencia (2010) and Bank of England calculations. Special thanks to Andy Haldane and Vas Madouros for providing their data.

Following Goodhart's law, as risk-based regulatory ratios increasingly became the "gold standard" of perceived resilience in successive generations of Basel accords, they became decreasingly useful as an indicator of future distress probability (Danielsson (2002)). Figure 17 crystallises this notion: banks' Tier 1 capital ratios in 2006 were uninformative about their true default probabilities. Several banks with high regulatory capital ratios in 2006 subsequently failed; conversely, several banks with low regulatory ratios in 2006 did not.

Recently, banks have begun to increase their regulatory capital ratios, largely by reducing average risk-weights. Without risk-weighting, some EU banks remain thinly capitalised compared with international peers. The mean leverage ratio of globally systemically important banks in the EU stood at 3.9% in the second quarter of 2013, compared with 4.5% for US G-SIBs (using IFRS-equivalent accounting standards) (Figure 18). This observation must be interacted with the findings from earlier in this section: that the EU banking sector is much bigger than in the US. As we shall see in Section 2 (Part A), banks operating in large banking systems tend to take more risk and are more vulnerable to systemic financial crises. Given this link, one would hope and expect systemically important banks in the EU to have higher leverage ratios than their counterparts in the US – not lower.

Figure 18: Globally systemically important banks' leverage ratios in Q2-2013



Source: FDIC. Notes: Leverage ratios are based on IFRS accounting. The black and dark grey bars show the leverage ratio according to IFRS accounting standards, using methodology described in ISDA (2012). The light grey bars show the GAAP leverage ratio for US banks (which is always higher than the IFRS-equivalent ratio).

Section 2: *Diagnosis*: Has Banking Expanded Too Much?

Section 1 described the radical transformations in the European banking system over the past 20 years: rapid growth in banks' size; higher concentration; and higher leverage among the largest banks. Should policymakers be concerned by these trends?

There are two potential reasons to care. The first is that these developments might impair growth in the real economy. The second is that large banking systems may be associated with excessive risk taking by banks: as systems become very large, banks may become "too large to save" by domestic taxpayers, thereby increasing the likelihood of sovereign and financial crises.

Of course, these reasons are closely intertwined. Financial crises tend to lower persistently the growth rate of the economy, and increase its volatility (Reinhart and Rogoff (2011)). But the conceptual distinction between these reasons for concern is useful for analytical purposes.

We analyse the implications – for growth, financial stability and fiscal sustainability – of three possible dimensions of overbanking. Each dimension is associated with one of the phenomena identified in Section 1, and each of them raises concerns for social welfare.

- In Part A, we look at the **volume of private credit created by banks** relative to the size of the real economy. Some recent academic literature finds that private credit creation reduces long-run growth beyond a certain threshold. One of the reasons for this link is that bloated banking systems marginally divert both financial and human capital away from more productive projects. In addition, high levels of bank credit are associated with higher levels of bank risk and systemic risk. In some countries, banking systems have reached such a size that they may be too large to save by their respective national governments in the event of a systemic crisis.

- In Part B, we look at **Europe's bank-based financial structure.** Recent data contradict the classical paradigm that financial structure is irrelevant for growth. Our regressions show that countries with bank-based systems tend to feature somewhat lower long-run growth, controlling for other factors. Bank credit supply is more volatile than supply from debt capital markets, and thus amplifies both financial and real instability.

- In Part C, we look at **banks' various activities**. Many EU banks have adopted a "universal bank" business model – combining lending to the real economy with other activities, such as securities business, derivatives trading and lending to governments. Just 31% of the aggregate balance sheet of euro area banks is made up of lending to the euro area real economy. However, there is evidence that universal banks may impose greater social costs than specialised intermediaries, by taking greater risk exposures in securities markets and thereby exacerbating the financial accelerator mechanism (that is, the link between asset price shocks, the supply of credit and real economic activity). We produce novel evidence that, over 2000-12, large universal banks in the EU were exposed to a substantially greater systemic risk than smaller and more narrowly focused banks.

In each of the following subsections, we elaborate on these three dimensions of overbanking, and their implications for economic growth and financial crises.

Part A: Excessive private credit creation by banks

Implications for growth

The effect of financial development on the real economy has been the subject of extensive research. Generally, this research has identified institutional reforms as the "prime mover" of financial development, and has studied how the resulting expansion of bank credit and securities markets has affected economic growth. Examples of such institutional reforms are (i) bank liberalisations, which allow the entry of new, more sophisticated intermediaries, resulting in cheaper and more abundant finance; and (ii) reforms that increase creditor or shareholder protection, thereby reducing moral hazard in lending and equity issuance, and easing financial constraints on firms. In these cases, financial development increases the external funding available to firms, facilitating business start-ups and expansion. Financial development can also foster growth by allocating capital more efficiently, channelling resources to better projects and thus boosting total productivity.

The correlation between financial development and economic growth does not establish causality. To determine whether financial development is a cause or effect of growth, researchers have used various econometric techniques and identification strategies that control for the possible feedback effects of growth on financial development, using three types of data: country, industry and firm-level.

- **Using country-level data**, King and Levine (1993a, 1993b) relate economic growth rates to measures of lagged financial development in 80 countries. All their indicators of economic performance are positively associated with the size of the financial sector at the beginning of the sample period. However, the use of predetermined variables to measure financial development only partly overcomes the problem of endogeneity. An omitted common variable could still determine both long-run growth and the initial level of financial development, generating spurious correlation. Accordingly, researchers have sought instruments that are unquestionably exogenous. One choice has been the type of legal system, which La Porta, Lopez-de-Silanes and Shleifer (1998) show to be correlated with the size of a country's financial market. Legal systems can be considered as exogenous because they were created centuries ago and spread mainly through occupation and colonialism. Beck, Levine and Loayza (2000a) use legal origin as an instrument for financial development, and also find that the size of the financial sector is positively correlated with the growth of per capita GDP and of total factor productivity – a result corroborated and extended by other studies including Beck, Levine and Loayza (2000b) and Demirgüç-Kunt and Levine (2001).

- Another strand of inquiry relies on **industry-level data** to address causality, on the hypothesis that financial development should be more beneficial to the growth of industries that are more dependent on external finance. Rajan and Zingales (1998) construct their test by first identifying each industry's need for external finance from US data (positing that the US financial system is highly developed) and then interact this industry-level "external dependence" variable with a country-level measure of financial development. This interacted variable is then included in a regression for industry-level growth, where its coefficient should capture the contribution of financial development to growth arising from the implied attenuation of financial constraints. The regression includes fixed effects to control for time-invariant country and sector characteristics. Applying this approach to industry-level data for a large sample of countries in the 1980s, Rajan and Zingales conclude that financial development affects economic growth disproportionately in industries dependent on external finance.

- Further evidence on the nexus between finance and growth comes from **firm-level data**. Guiso, Sapienza and Zingales (2004) find that in Italy local financial development, as measured by self-reported information on households' access to credit, is positively correlated with an individual's probability of starting a business, the ratio of new firms to the population, the growth rate of firms (beyond internally financed growth), and per capita GDP. They control for the potential endogeneity of financial development by instrumenting their indicator with bank branch density as determined by regulation in 1936. Guiso, Jappelli, Padula and Pagano (2004) apply the Rajan-Zingales approach to data for companies in the EU and in central and eastern Europe, producing firm-level estimates consistent with industry-level studies and finding that financial development fosters the growth of smaller firms in particular.

A direct way of addressing the question of causality is to exploit the "quasi-natural experiments" offered by specific (and arguably exogenous) changes in financial market regulation. For instance, Jayaratne and Strahan (1996) find that the relaxation of geographical restrictions on bank expansion in the US between the 1970s and the early 1990s was associated with faster local growth. Dehejia and Lleras-Muney (2007) report the same relationship using earlier data, showing that changes in state-level banking regulation between 1900 and 1940 were also associated with higher growth. Bertrand, Schoar and Thesmar (2007) find that the deregulation of the French credit market in 1984 was associated with greater asset and job reallocation at the industry level, and better allocation of capital across firms. Banks became less willing to bail out poorly performing firms, and firms in bank-dependent sectors became more likely to restructure.

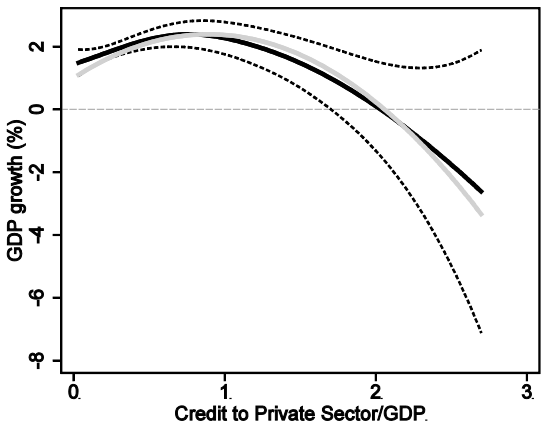
Financial development: Harmful for growth beyond a critical threshold

More recent literature has found that the previous evidence on the positive marginal effect of financial development on economic growth requires an all-important caveat: it only holds true up to a threshold level of credit to GDP. Beyond a critical level of financial development, there is no association – or even a negative one – between financial development and economic growth.

Pagano and Pica (2012) re-estimate the growth regressions according to the Rajan-Zingales specification using UNIDO data for annual value added for 28 industries and 63 countries from 1970 to 2003. They find – as did Rajan and Zingales (1998) on their shorter sample – that, over the entire sample, higher financial development is associated with faster growth of value added in the sectors more heavily dependent on external finance. But in the subsample of OECD countries, financial development has no significant impact on value added growth. For the non-OECD countries, by contrast, the estimates indicate that financial development does spur value added. This suggests that the results for the whole sample are in fact driven by the non-OECD countries, where firms are more likely to experience financing constraints. Hence, the evidence that financial development benefits growth appears to come exclusively from the countries where financial development is at a relatively early stage, such that an expansion of the financial industry tends to be associated with an increase in firms' access to finance. Beyond a certain point, financial development does not appear to contribute significantly to real economic activity. This result is consistent with the vanishing effect of finance on growth reported by Rousseau and Wachtel (2011).

Other recent studies show that beyond a certain threshold the expansion of credit actually has a *negative* effect on growth. Arcand, Berkes and Panizza (2012) show country- and industry-level evidence that the positive association between finance and growth has decreased over time, with a negative and significant correlation between private credit to GDP and GDP growth when the credit-to-GDP ratio exceeds 100% of GDP.

Figure 19: Too much finance = lower growth?



Source: Arcand, Berkes and Panizza (2012). The chart replicates their Figure 7, which in turn takes data from regression results shown in their Table 5.

Figure 19 (taken from Arcand, Berkes and Panizza (2012)) shows the authors' non-parametric estimates of the relationship between growth and credit to the private sector: when this relationship is allowed to take a general form, it is concave and non-monotone. The semi-parametric smooth given by the solid black line in the chart shows that GDP growth reaches a maximum when credit to the private sector is at 76% of GDP. The chart also shows that the fit obtained by fitting a quadratic function (the solid grey line) to the relationship is a good approximation of the semi-parametric fit. The dotted lines show the 95% confidence intervals. A similar hump-shaped relationship between financial deepening and economic growth is found by Cecchetti and Kharroubi (2012), Barajas, Beck, Dabla-Norris and Yousefi (2013) and Law and Singh (2014).

Similarly, Manganelli and Popov (2013) find that financial development has a non-monotonic effect on industry growth: beyond a threshold, finance-dependent industries grow relatively more slowly. Over six countries in the original sample used by Rajan and Zingales (1998) and Fisman and Love (2007) are beyond the threshold. Ductor and Grechyna (2013) also find that when the financial sector growth rate exceeds that of real sector industries by 4.5 percentage points, the correlation turns negative. They attribute this non-linearity to financial crises.

Finally, an ongoing study by the OECD (Cournède and Denk (2014)) estimates growth regressions on data for OECD and G20 countries between 1961 and 2011, where real per capita GDP growth is regressed on a measure of financial development (value added of the financial sector or private credit scaled by GDP) and a set of controls (investment rate, average years of schooling, population growth and country fixed effects). Cournède and Denk (2014) find that financial development has a negative, large and statistically significant coefficient: an increase of private credit by one standard deviation (15% of GDP) is associated with a GDP growth rate that is 0.4 percentage points lower than otherwise. On the surface, this finding may appear to be in contrast to previous studies, which find a hump-shaped relationship between financial development and growth. However, the absence of such a hump-shaped relationship in the OECD study can be explained by the fact that the relationship is estimated in a sample of OECD countries, where the credit-to-GDP ratio exceeds 90% for more than a quarter of the observations, which is approximately the level of financial development at which the relationship turns negative according to the other studies.

There is also evidence that financial development increases the sensitivity of output and employment to banking crises. Extending the Rajan-Zingales approach, Kroszner, Laeven and Klingebiel (2007) find that during banking crises the sectors that depend heavily on external finance suffer sharper output contraction in countries with a higher degree of financial development. Pagano and Pica (2012) find a similar result for employment. Neither study covers the post-2007 recession.

However, there is no unambiguous evidence on whether financial development is associated with the volatility of real output growth. Beck, Lundberg and Majnoni (2006) find no robust relationship between these two variables, using panel data covering 63 countries over the period 1960-97. The subsequent studies by Loayza and Rancière (2006) and Beck, Degryse and Kneer (2014) find that the reason for such ambiguity is that the relationship changes sign depending on whether one looks at the short or

the long-run. In the short-run, financial liberalisation can have disruptive effects, leading to excessive credit expansion, which can easily result in an overheating of the economy and then a crisis. Moreover, it is well known from the literature on banking and currency crises that a sharp expansion of domestic credit is among the best predictors of crises and subsequent recessions (e.g. Kaminsky and Reinhart (1999)). However, in the long run, the positive growth effects of greater financial depth uncovered by the earlier literature on empirical growth may lead both to an increase in the rate of growth and to a reduction in its volatility. Indeed, Beck, Lundberg and Majnoni (2006) find, based on a sample of 77 countries for the period 1980-2007, that intermediation activities increase growth and reduce volatility in the long run but, over shorter horizons, their stimulus to growth comes at the cost of higher volatility in high-income countries.

Why does the size of the banking system have negative real effects when it increases past a given threshold? There are two likely reasons, which we will discuss in turn.

First, over-expansion of banking leads to misallocation of financial and human capital, which harms growth as capital is not allocated according to its highest marginal product. Specifically, the rapid expansion of banking is likely to be accompanied by (i) an increase in the fraction of housing loans relative to company loans, and a corresponding change in the investment mix of the economy; and (ii) an increase in the fraction of talent employed in the finance industry rather than elsewhere in the economy.

Second, larger banking systems also tend to experience more severe financial crises, which in turn are associated with deeper recessions (Reinhart and Rogoff (2011)). Alessi and Detken (2014) show that a credit-to-GDP ratio above 92% provides an important early warning of impending financial crisis, when combined with observations on other variables (such as the debt service ratio and the credit-to-GDP gap).

Misallocation of financial capital

Suppose that for some reason, such as badly designed prudential regulation, a bank wishes to expand its balance sheet rapidly. The bank will focus on easily scalable activities like residential mortgage lending rather than lending to companies. There are three reasons for this.

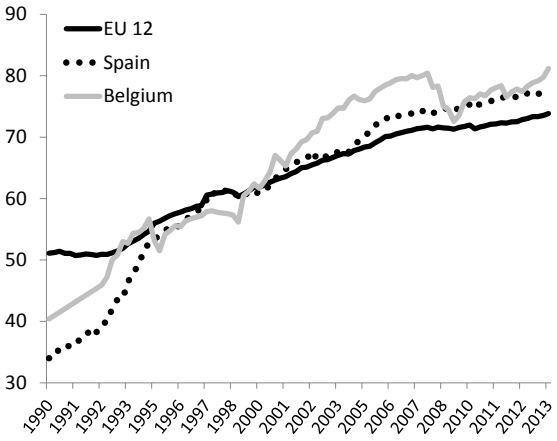
- First, residential mortgages are relatively standardised and generally well collateralised, so they require much less screening effort than loans to companies, which are heterogeneous and require the careful evaluation of applicants' business plans and entrepreneurial qualities (see the "lazy bank" model by Manove, Padilla and Pagano (2001)).

- Second, and for precisely the same reasons, mortgage loans can be more easily securitised and therefore liquidated, freeing additional resources for balance sheet expansion. Hence, they can be used to expand a bank's balance sheet more quickly.

- Thirdly, if credit expansion occurs at the aggregate level, it tends to increase collateral values, which feeds back onto credit expansion (as in the "financial accelerator" model of Bernanke, Gertler and Gilchrist (1999)).

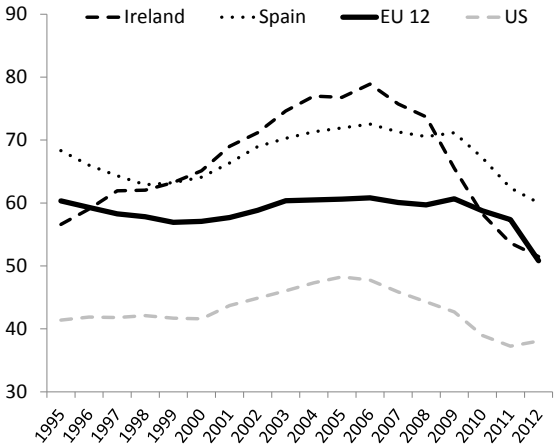
We can observe this phenomenon – banks' rapid expansion into loans secured against residential real estate – in the data. Figure 20 shows housing loans as a proportion of total loans (to households and non-financial corporates). The series shows a clear upward trend for all countries (shown by the solid line), and particularly for Spain and Belgium. This rapid increase in mortgage lending encouraged a construction boom – as shown in Figure 21.

Figure 20: Housing loans as % of total bank loans to households and NFCs



Source: ECB (BSI).

Figure 21: Investment in housing as % of total investment



Source: OECD. Notes: Housing investment includes investment in dwellings and other buildings and structures. Total investment refers to total gross fixed capital formation.

Cournède and Denk (2014) find that, if the growth of GDP per capita is regressed separately on credit to households and credit to non-financial corporations, both of these variables have negative coefficients, but the coefficient of credit to households is about twice as large (in absolute value) as that of credit to firms. Hence, in developed countries the expansion of lending to households – most of which is formed by mortgage loans – and the associated increase in the fraction of residential construction in total investment appears to be associated with a slowdown in growth.

There are at least three reasons for this finding that bank credit biased towards lending to households is associated with lower economic growth.

- First, Jappelli and Pagano (1994) show – in the context of an overlapping generations model – that giving households better access to credit lowers the national saving rate, as well as the growth rate of the economy if the model allows for endogenous growth. These predictions are borne out by their evidence for the period 1960-85: cross-country regressions of saving and growth rates on indicators of households' credit constraints show that, already back in the 1980s, financial deregulation and the associated expansion of household borrowing contributed to the decline in saving and growth rates in the OECD countries. These early findings dovetail with the more recent evidence by Cournède and Denk (2014).

- Second, the residential construction industry typically features low productivity, so biasing the composition of investment towards residential construction reduces economic growth. Indeed, there is evidence that excessive real estate lending crowds out firms' access to external finance and therefore their real investment: Chakraborty, Goldstein and MacKinlay (2013) find that US banks that became increasingly active mortgage lenders simultaneously decreased their commercial lending. As a result, the firms tied to these banks had lower levels of real investment following a rapid expansion of mortgage lending.

- Third, a boom in household credit may foster the construction of housing that is not wanted under normal credit conditions. This leads to a huge waste of resources, as witnessed by the empty housing developments built in Ireland, Spain and the United States during the pre-crisis years. This waste of physical resources is the real counterpart of the financial losses accumulated by banks (and later largely transferred to taxpayers) once the household credit boom stopped.

Misallocation of human capital

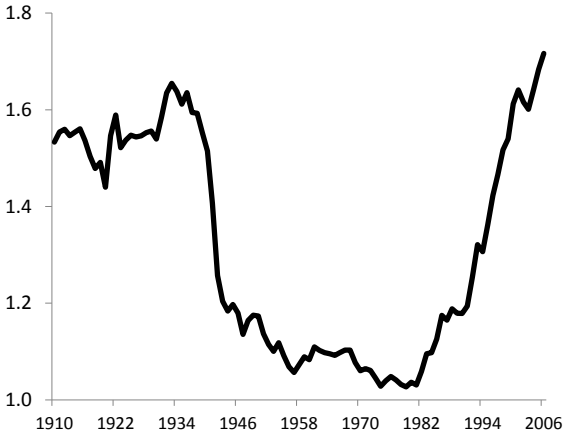
An excessively large banking sector may also distort the allocation of human capital, by attracting too much talent into the financial sector. As James Tobin remarked, rather presciently, in 1984:

> *"…we are throwing more and more of our resources, including the cream of our youth, into financial activities remote from the production of goods and services, into activities that generate high private rewards disproportionate to their social productivity".*

Information rents in the financial sector attract talent, which may generate further scope for informational rent extraction, e.g. by creating and marketing complex financial products or through complex and opaque banking organisations (Bolton, Santos and Scheinkmann (2011)). Philippon and Reshef (2012) show that in the US the average compensation of employees has increased more in the finance sector than elsewhere in the economy. Figure 22 shows that the average wage in the finance industry relative to other industries has increased since the 1980s and nearly reached a factor of two by 2006. Figure 23 illustrates how much this relative wage exceeds an estimated wage for a given level of education and skills set.

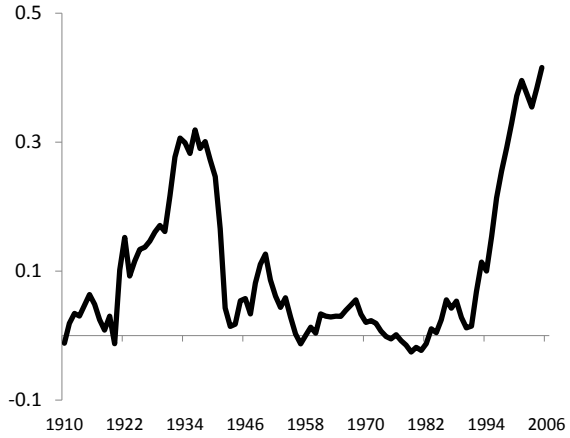
This happened also in Europe. Bell and van Reenen (2013) show that in the UK the rise in bonuses paid to financial-sector employees has accounted for around two-thirds of the increase in the national wage bill taken by the top 1% of workers since 1999. Similarly, Célérier and Vallée (2014) examine the wage premium in the finance industry in France, and show that this premium rewards talent more than in other industries. They exploit individual French data on the ranking in a competitive examination to build a precise measure of talent.

Figure 22: Relative wage in finance in the US



Source: Philippon and Reshef (2012). Note: The relative wage is the ratio of the average wage in finance to the average wage in the nonfarm private sector.

Figure 23: Excess wage in finance in the US



Source: Philippon and Reshef (2012). Notes: The excess wage is constructed by deducting a benchmark wage from the relative wage in Figure 22. The benchmark wage is based on a relative skill series (i.e. the difference in the share of highly educated workers in finance and the nonfarm private sector) and a skill premium series.

Implications for bank risk and banking crises

We have presented evidence that excessively large banking systems have negative implications for growth. Next, we show that larger banking systems also tend to be populated by riskier banks, both in terms of their individual probability of default and their exposure and contribution to systemic risk.

If large banking systems simply relieve financial constraints on solvent firms, there should be no link between the size of the banking system and banks' risk-taking. However, as banking systems increase in size, they are increasingly likely to finance negative net present value projects, as the pool of creditworthy borrowers becomes increasingly thin. Banks' systematic financing of negative net present value projects is only revealed once the mispricing of credit risk by banks is corrected.

The economics underlying the tendency of large banking systems to take excessive risk is captured in the model of Acharya and Naqvi (2012). Moral hazard within banks induces excessive risk-taking, which is exacerbated when bank liquidity is abundant – the counterpart of excessive size. In their model, banks face random deposit withdrawals and, in the event of a liquidity shortfall, incur a penalty, as they are forced to "fire sell" assets. Absent moral hazard, this penalty, together with the expected profits from the funding of projects, induces banks to choose a lending rate that properly reflects the risk of the projects. But if loan officers' effort is unobservable, then it is optimal to tie officers' compensation to the quantity of loans that they originate, and randomly carry out a costly audit to determine whether the officers have over-lent or underpriced loans. The time-consistent audit policy is to audit the loan officer only when the liquidity shortfall is sufficiently large. So when the bank enjoys abundant liquidity, loan officers will rationally anticipate a lenient policy of infrequent audits and will accordingly engage in excessive lending, charging an interest rate that underprices credit risk.

Loose monetary policy is one intervening variable which drives abundant liquidity, bank balance sheet expansion and excessive risk-taking. Low interest rates encourage banks to make larger and riskier bets in a "search for yield", both in lending business and proprietary trading. Dell'Ariccia, Igan and Laeven (2012) find that the rapid expansion of credit was coincident with declining lending standards prior to the subprime mortgage crisis. Jiménez, Ongena, Peydró and Saurina (2014) analyze post-1984 data from Spain's credit register using sophisticated panel data techniques to distinguish the effects of banks' policies from those of changes in loan demand by their clients, and find that a lower overnight interest rate induces under-capitalised banks to expand credit to riskier firms, terminate loans to risky firms less frequently, and extend longer and larger loans to risky new applicants. Relatedly, Maddaloni and Peydró (2011) analyze the determinants of banks' lending standards in the euro area using bank lending surveys, whereby central banks gather information on the terms of credit for bank customers, and show that low short-term interest rates soften lending standards for both companies and households, especially if rates stay "too low for too long".

We capture the role of banking system size and loose monetary policy in explaining excessive bank risk-taking in a fixed-effects panel regression model, which controls for unobserved time-invariant heterogeneity across banks. The regression is estimated for a sample of 195 EU banks. However, the actual sample used in each specification is smaller, owing to data availability for the dependent variable, which is bank risk. We measure bank risk in five different ways:

- SRISK is a market-based estimate of the amount of equity capital which a bank would need to raise in the event of system-wide stress. In particular, the shortfall is defined as the quantity of equity capital required for a bank to satisfy a market leverage ratio of 8% (for GAAP banks) or 5.5% (for IFRS banks), conditional on an aggregate equity market valuation decline of 40%. SRISK measures both an individual bank's exposure to systemic risk and its contribution to

systemic risk, since large equity capital shortfalls at a time of system-wide stress would exacerbate the crisis. Calculation of the SRISK variable is based on work by Brownlees and Engle (2012) and Acharya, Engle and Richardson (2012).

- The bank-level probability of default, calculated by the National University of Singapore's Risk Management Institute's Credit Research Initiative. The probabilities of default are calculated on the basis of a "forward intensity model" (see Duan, Sun and Wang (2012) and Duan and Fulop (2013)), similar to that proposed by Duffie, Saita and Wang (2007). Essentially, the probability of default is computed as a function of different input variables. The probabilities of default are calculated for time horizons between one month and five years. For comparability with data from Moody's KMV, our reported regressions use a time horizon of one year. The qualitative results are robust to this choice.

- The bank-level probability of default (over one year), also known as the Expected Default Frequency, calculated by Moody's KMV. This measure of default probability is calculated using an extension of the Black-Scholes-Merton option-pricing framework (see Hamilton, Munves and Sun (2012)). In particular, the EDF model combines information on banks' leverage, the market value of banks' assets, the volatility of banks' asset values, and a proprietary database on historical default frequencies.

- The CDS spread, which provides a standardised measurement of the cost of insuring against a bank's default. The spread comprises an expected loss component and a risk premium.

- The Z-score, which is calculated as the sum of the mean return on assets and the mean ratio of equity to assets, divided by the standard deviation of the return on assets. The Z-score is a standard measure of (the inverse of) bank risk using balance-sheet information.

Across all of these measures of bank risk, larger banking system size is correlated with higher bank risk one year later, conditional on other variables (see Table 1).[3] Size at the bank level (measured as the lag of the log of bank assets) is also positively correlated with higher bank risk. In each of the five regressions, we also estimate parameters on a vector of control variables. In particular, we control for within-bank time-variation in real interest rates, lending margins and GDP growth, all at the country-level. The regression reported in Table 1 also includes year dummies.

Real interest rates capture the effect of the monetary policy stance on bank risk-taking. As expected, lower real interest rates are associated with more bank risk in all specifications (except in column II, where the finding is insignificant). The lending margin has an ambiguous effect on bank risk: the effect is positive in column I, negative in column III, and insignificant elsewhere. The size of the lending margin at the country-level does not convey information about whether risk is correctly priced at the bank-level, and so the ambiguous finding is not surprising. Finally, within-bank variation in GDP growth does not significantly explain bank risk.

[3] These estimates obtained with bank-level data are consistent with those reported in Pagano (2013), where similar regressions are estimated on a panel of country-level data (see Table 2, p. 134).

Table 1: **Bank risk and banking system size**

DV	SRISK	PD (NUS)	PD (KMV)	CDS	Z-Score
	I	II	III	IV	V
Bank credit / GDP (1Y lag)	78,881***	0.425***	0.0199***	0.217	-0.946**
	(17,695)	(0.122)	(0.00583)	(1.097)	(0.435)
Log of bank assets (1Y lag)	44,455***	0.129***	-0.245*	68.63**	-3.009
	(7,737)	(0.0453)	(0.135)	(27.40)	(9.913)
Real interest rate	-5,496***	-0.00732	-0.135**	-19.55*	-9.083**
	(1,998)	(0.00974)	(0.0530)	(11.60)	(4.323)
Lending margin	10,640***	0.0252	-0.302**	22.45	-3.861
	(3,371)	(0.0205)	(0.133)	(18.95)	(10.32)
GDP growth	-1,344	-0.0109	-2.818	124.3	521.0*
	(2,354)	(0.0136)	(3.999)	(442.6)	(265.7)
Constant	-545,036***	-0.630	1.640	-800.9***	232.2**
	(86,705)	(0.451)	(1.446)	(264.8)	(111.4)
Observations	291	722	439	177	580
R-squared	0.514	0.326	0.248	0.301	0.047
Number of unique banks	46	92	98	48	116

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Specification: Fixed effects panel regression. Year dummies are used but their coefficients are not reported.

Data: Unbalanced panel of 195 EU15 banks, observed yearly, 1994-2012 (in columns I and II) and 1994-2011 (in columns III, IV and V).

Description of dependent variables: "SRISK" is an estimate of the USD quantity of equity capital required to recapitalise a bank in the event of system-wide stress (source: NYU V-Lab), based on work by Brownlees and Engle (2012) and Acharya, Engle and Richardson (2012). "PoD (NUS)" is the firm-level probability of default calculated by the National University of Singapore's Risk Management Institute (see Duan, Sun and Wang (2012) and Duan and Fulop (2013)). "PoD (KMV)" is the firm-level probability of default ("EDF") calculated by Moody's KMV (see Hamilton, Munves and Sun (2012)). "CDS" is the bank-level five-year credit default swap spread sourced from Credit Market Analytics (CMA). "Z-Score" is the bank-level Z-score (calculated as the sum of the mean return on assets and the mean ratio of equity to assets, divided by the standard deviation of the return on assets), sourced from Bankscope.

Description of independent variables: "Bank credit / GDP (1Y lag)" is the domestic credit provided by the banking sector divided by GDP, and lagged by one year (source: World Bank). "Log of bank assets (1Y lag)" is the natural log of total bank assets, lagged by one year (source: Bloomberg in columns I and II and Bankscope in columns III, IV and V). "Real interest rate" is the monetary policy rate minus the year-on-year change in the consumer price index (source: World Bank). "Lending margin" is the average country-level spread between the average bank lending rate and the Treasury bill rate (source: World Bank). "GDP growth" is the year-on-year change in real GDP per capita (source: World Bank).

Table 1 captures the average within-bank effect of banking system size on bank risk, which is positive at the margin. However, it is likely that the bank credit-to-GDP ratio has a non-linear effect on bank risk. In particular, the model of Acharya and Naqvi (2012) suggests banks with abundant liquidity will under-price credit risk in a non-linear fashion, such that an increase in liquidity has a disproportionate impact on banks' under-pricing of credit risk. We therefore hypothesise that an increase in credit to GDP from an already high level will have a disproportionately strong marginal effect on bank risk. At low levels of financial development, we do not expect to observe such a relationship.

We investigate potential non-linearity in the relationship between banking system size and bank risk in Table 2. This table re-estimates column II of Table 1, using the probability of default calculated by the National University of Singapore's Risk Management Institute. Table 2 uses a larger global sample than in Table 1 (namely, a panel of 1,179 global banks observed at yearly frequency over 1994-2012), instead of EU banks only. The larger number of observations permit estimation of the regression separately for two subsamples: one in which the bank credit-to-GDP ratio is less than 200% (column II), and another in which the ratio is more than 200% (column III).

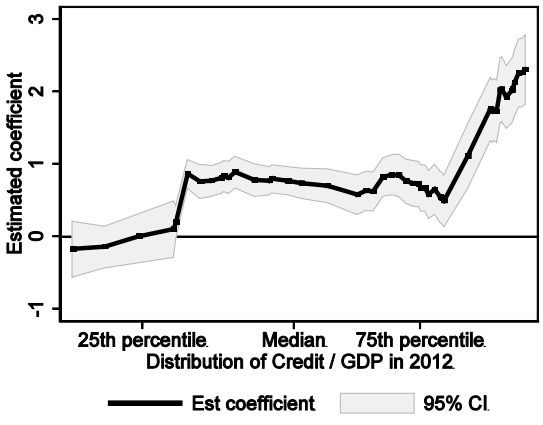
The results suggest strong non-linearity. Although the coefficient of the bank credit-to-GDP variable is positive and significant in both columns II and III, its magnitude is more than three times greater in the subsample for which the bank credit-to-GDP ratio is above 200%.

We can also capture the non-linearity of the relationship between bank credit-to-GDP and bank risk over a continuous distribution of bank credit-to-GDP by using a more sophisticated econometric technique. The method is one of Kernel-weighted panel regressions.

It works as follows. First, we adopt the specification of the benchmark panel regression shown in Table 2. This regression is then estimated for *each* observation in the sample. In this dataset, there are 12,629 observations, which therefore imply 12,629 separate panel regressions. Crucially, each of these 12,629 panel regressions is slightly different from the others, in the sense that observations are given different weights depending on their distance in the distribution of bank credit-to-GDP from the reference observation. For example, if the reference observation were 10% of bank credit-to-GDP, the kernel estimator would weight nearby observations (such as 15% of bank credit-to-GDP) much more strongly than distant observations (such as 100% of bank credit-to-GDP).

The results are shown in Figure 24. Qualitatively, they are very similar to the results shown in Table 2: beyond a certain threshold, we find that the marginal effect of bank credit-to-GDP on bank risk becomes much more strongly positive. We can now observe this "threshold effect" along a continuous distribution of the bank credit-to-GDP variable. Beyond the 80th percentile of the bank credit-to-GDP distribution – which in 2012 corresponded to a ratio of around 165% – the marginal effect on bank risk of a marginal increase in bank credit-to-GDP becomes substantially higher. The estimated coefficient for countries with a credit-to-GDP ratio above 165% is around three times higher than the estimated coefficient for countries in the middle 50% of the distribution.

Figure 24: Estimated panel regression coefficients (on bank credit-to-GDP) over the distribution of bank credit-to-GDP



Source: Bloomberg; own calculations. Note: "CI" stands for confidence interval.

Table 2: **The non-linear effect of the credit-to-GDP ratio on bank risk**

DV	Probability of Default (NUS)		
	Full sample	<200% credit-to-GDP	>200% credit-to-GDP
	I	II	III
Bank credit to GDP (1Y lag)	0.783***	0.672***	2.064***
	(0.162)	(0.106)	(0.696)
Log of bank assets	-0.192***	0.0268	-0.254
	(0.0681)	(0.0447)	(0.225)
Constant	2.753***	-0.674	-0.766
	(0.593)	(0.443)	(3.223)
Observations	12,629	7,152	5,477
R-squared	0.063	0.104	0.108
Number of unique banks	1,179	924	647

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Specification: Fixed effects panel regression. Year dummies are included but their coefficients are not reported.

Data: Unbalanced panel of 1179 global banks, observed yearly, 1994-2012.

Description of dependent variable: "Probability of Default (NUS)" is the firm-level probability of default calculated by the National University of Singapore's Risk Management Institute (see Duan, Sun and Wang (2012) and Duan and Fulop (2013)).

Description of independent variables: "Bank credit / GDP (1Y lag)" is the domestic credit provided by the banking sector divided by GDP, and lagged by one year (source: World Bank). "Log of bank assets" is the natural log of total bank assets (source: Bloomberg).

Implications for sovereign risk

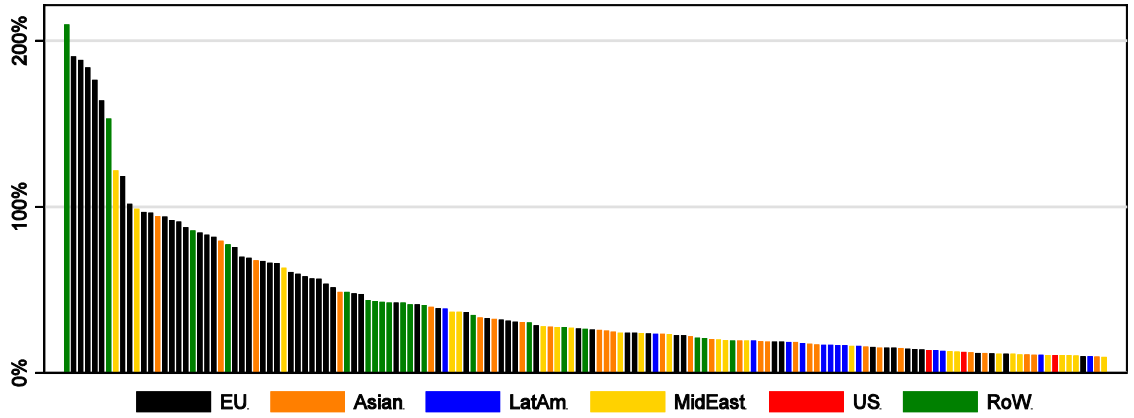
In addition to banking crises, large banking systems can trigger sovereign debt crises. Banks' liabilities are taxpayers' contingent liabilities. This is true de jure – in the EU, bank deposits are protected (up to a certain threshold) by the Directive on deposit-guarantee schemes – and de facto: in an attempt to avoid banking crises, governments might choose to bail out banks' unsecured creditors. After three years of sovereign debt crisis in Europe, the risk that large banking systems destabilise sovereign debt dynamics hardly needs elaborating. Nevertheless, that risk continues to be elevated: national banking systems are large relative to home economies, and so far no credible resolution mechanisms have been available to deal with the distress of very large banks, or the simultaneous distress of many smaller banks.

Without credible cross-border resolution regimes, banks are "global in life; national in death". This is particularly true in the EU, where there is a common market for banking services but not yet a common strategy or fund for bank resolution. Many EU banks have grown to the size of the common EU market – and have therefore far outgrown their domestic base. The home economy remains an appropriate yardstick, however, since bank resolution remains a national preoccupation until the Single Resolution Mechanism is fully in place in the euro zone.

Figure 5 and Figure 6 in Section 1 revealed the size of EU banking systems relative to national output. In addition to the contingent liabilities created by these large banking systems, large individual banks create idiosyncratic risk for national taxpayers. Figure 25 illustrates the magnitude of this risk in Europe. EU banks dominate the left-hand-side of the distribution: of the 40 global banks with liabilities greater than 50% of domestic GDP, 29 are in the EU. Seven EU banks have liabilities greater than 100% of domestic GDP. By contrast, the largest US bank – JPMorgan – has liabilities worth 15% of US GDP (or 23% using IFRS accounting). On this measure, JPMorgan ranks alongside Commerzbank (24% of Germany's GDP) and Pohjola Bank (24% of Finland's GDP).

Ireland provides a vivid example of the real costs imposed by very large banks on domestic taxpayers. In 2007, Bank of Ireland amounted to 120% of Irish GDP, and Allied Irish 100%. In September 2008, the Irish government expressly guaranteed all bank bondholders. Many of these guarantees ultimately transferred onto the government balance sheet, leading to a deficit of 32% of GDP in 2010 and prompting instability in Ireland's sovereign debt dynamics.

Figure 25: Listed banks' liabilities as % of domestic GDP in 2012



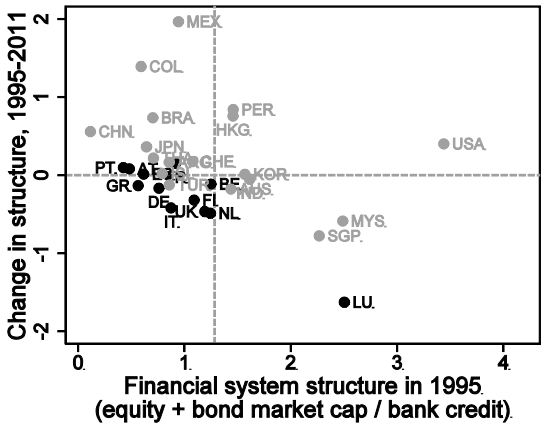
Sources: Bloomberg and the IMF. Ecobank Transnational is not shown for presentational purposes: its liabilities are 466% of Togo's GDP.

Part B: Excessively bank-based financial structure

In Section 1, we discovered not only that Europe has a bank-based financial structure by international standards – but that this bank bias has *increased* over the past 15 years.

Europe's shift towards a more bank-based financial structure bucks the international trend. Typically, one would expect markets to become relatively more important as institutions become stronger and the rule of law more entrenched (La Porta, Lopez-de-Silanes, Shleifer and Vishny (1997); and La Porta, Lopez-de-Silanes and Shleifer (1998)).

Figure 26: Changing financial structures

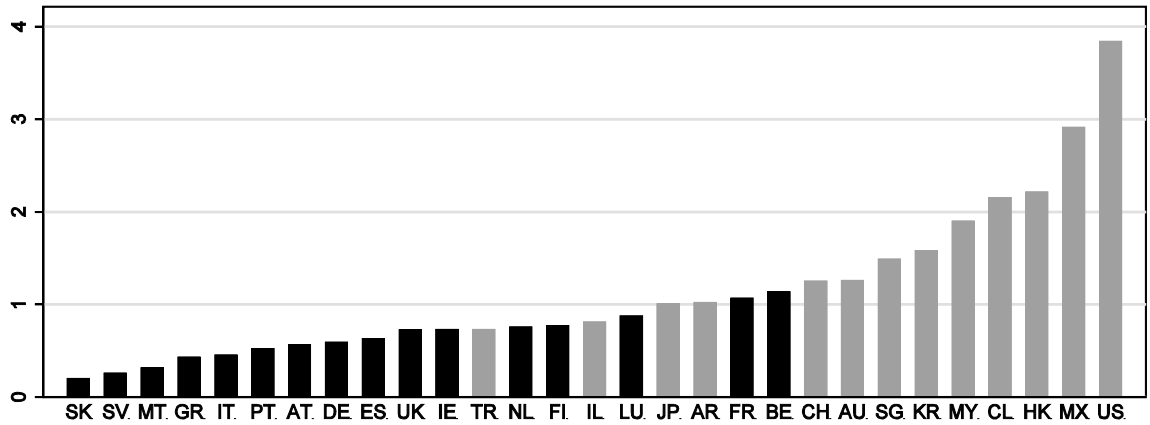


Source: World Bank Financial Development and Structure Dataset. Notes: Financial structure is measured as the ratio of stock and bond market capitalisation to bank credit (to the private sector). Bank loans includes private credit by deposit money banks.

Indeed, most non-EU countries have become more market-based since 1995 (i.e. the grey dots lie above the horizontal line in Figure 26). By contrast, most EU countries' financial systems have become even more bank-based (i.e. the black dots lie below the horizontal line). Moreover, most EU countries were already more bank-based in 1995 (i.e. the black dots lie to the left of the vertical line, which is drawn at the sample mean of financial structure in 1995).

Figure 27 plots the resulting financial structure in 2011. Most EU countries (depicted by black bars) lie to the left of the distribution: they are more bank-based than the rest of the world. Figure 27 also reveals some surprising country-specific results. For example, the UK – typically cited alongside the US as a paragon of market-based financial intermediation – has a financial structure nearly as bank-based as Germany's. The UK's bond market is relatively small, and its sizeable equity market is nevertheless dwarfed by one of the world's largest banking systems. In the EU, only two countries – France and Belgium – have a capitalisation of stock and bond markets which exceeds bank credit. All EU countries shown in Figure 27 – except France and Belgium – have a financial structure which is more bank-based than Japan's.

Figure 27: Financial structure in 2011: Europe compared with the rest of the world



Source: World Bank Financial Development and Structure Dataset. Financial structure is measured as the ratio of stock and bond market capitalisation to bank credit (to the private sector). Bank loans includes private credit by deposit money banks.

So Europe has a heavily bank-based financial structure by international standards. But does this matter? Are certain institutional environments more efficient than others in allocating financial capital?

Much of the literature answers: "not necessarily". According to this view, financial structures develop endogenously as the most efficient institutional arrangements to supply financial services, given exogenous circumstances – such as the strength of property rights (La Porta, Lopez-de-Silanes, Shleifer and Vishny (1997); Levine (1997)) and social culture (Kwok and Tadesse (2006)). Moreover, financial structure may develop in response to the industrial structure of the real economy (Carlin and Mayer (2003); Allen, Bartiloro and Kowalewski (2007)). For example, an industrial structure with many medium-sized firms, which tend to use physical capital intensively in production, may be more efficiently served by a bank-based financial structure. Such firms tend to have predictable (low-volatility) returns and easier access to collateral (physical capital). By contrast, an economy based on high-specification technological innovation, with firms – some very large – that use human and other intangible capital in production, may be better suited to a market-based financial structure.

This stylised link between real economy structures and financial structures helps to illustrate the underlying comparative advantages of bank- versus market-based structures. In particular:

- *Banks* specialise in gathering data and processing information ("screening") before originating loans, and in subsequently servicing loans ("monitoring"). Over time, banks (as relationship lenders) accumulate soft information about borrower types, mitigating information asymmetries (Boot (2000)), which would otherwise lead to adverse selection and credit rationing (Stiglitz and Weiss (1981)). Banks are therefore likely to be efficient originators and servicers of credit when the costs of acquiring information are particularly high. This is likely to be the case where borrowers are mostly small and use physical capital intensively in their production.

- *Markets* are typically seen by economists as the most efficient way of allocating resources – absent imperfections. Markets are therefore more efficient than banks when the problem of gathering and processing information about investment opportunities and monitoring the users of funds are less severe. Moreover, markets are likely to be better financiers of innovation where there is a wide diversity of prior beliefs about the expected value of new projects (Allen and Gale (1999)). Decentralised market-based financial structures permit optimistic investors to finance projects and pessimistic investors to "agree to disagree". Disagreement is most likely for potentially transformational (but uncertain) general purpose technological (GPT) innovations, which typify many recent innovations (Brynjolfsson and McAfee (2014)). Historically, most GPT innovations have occurred in countries with market-based financial structures (Allen (1993)), also because market-based structures tend to foster venture capital firms (Black and Gilson (1998)). Along these lines, Demirgüç-Kunt, Feyen and Levine (2013) find that capital markets become increasingly important as economies approach the technological frontier.

But banks have a dark side, which is not fully captured by the "banks-as-information-processors" view of financial services. In providing a solution to information gathering and processing problems, banks might simultaneously create new problems. Sometimes, these new problems are more costly than the initial failure. In particular, an excessively bank-based financial structure is prone to three problems: (i) the hold-up problem; (ii) entry deterrence via lobbying; and (iii) excessively volatile credit supply. We discuss these problems in turn.

1) The hold-up problem.

Banks screen (pre-contract) and monitor (post-contract). In doing so, banks become specialised producers of soft information about borrowers' credit quality. Over time, this creates a bilateral monopoly between borrower and lender. Borrowers who get into difficulty may possess bargaining power over relationship lenders, particularly if the lender is simultaneously distressed.

Bilateral monopoly helps to explain banks' tendency to exercise systematic loan forbearance as a gambling-for-resurrection strategy (Peek and Rosengren (2005); Caballero, Hoshi and Kashyap (2008); ESRB ASC (2012)). Distressed relationship lenders' tendency to favor existing clients (over more profitable projects) implies economy-wide misallocation of financial capital. By contrast, markets are less susceptible to the time-inconsistency problem: they can more credibly commit to terminate unprofitable projects, precisely because decentralised investors' monitoring costs are higher (Dewatripont and Maskin (1995)).

2) Entry deterrence via lobbying.

As incumbents in credit markets, banks have an incentive to raise entry barriers to competing suppliers of credit (Rajan and Zingales (2003); Perotti and Volpin (2004)).[4] According to this view, financial structures could continue to be bank-based long after such a structure is efficient, also because wide-reaching structural changes to the provision of finance are (perceived as) costly (Monnet and Quintin (2005)). Incumbent banks therefore benefit from path dependency in financial structure.

Moreover, since the production of banking services entails high fixed costs, banking systems tend to become highly concentrated. Very large banks possess inordinate political power, allowing them to lobby for private interests, such as lax prudential regulation and supervision. Politically powerful banks may also engender political corruption, as in the east Asian crisis (Krugman (1998)).

3) Volatile credit supply.

The credit cycle – defined as the empirical tendency of private credit creation to fluctuate over time – is one of the key drivers of the business cycle (Eichengreen and Mitchener (2004)). Banks drive the credit cycle: the growth of bank credit is much more volatile than growth in the stock of the outstanding debt securities of non-financial corporations. Figure 28 and Figure 30 (for the euro area and US respectively) illustrate that the volatility of bank credit growth (the black line) exceeds the growth in net debt securities' issuance (the grey line). Higher volatility is quantified in Figure 29 and Figure 31, which show the standard deviation of credit growth in the euro area and US respectively.

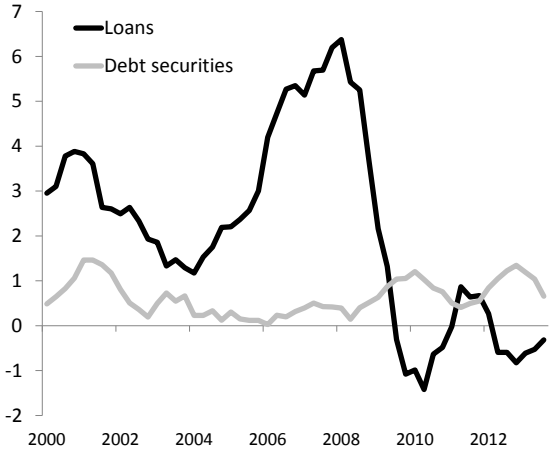
One explanation for the higher volatility of bank credit is that the supply of bank credit is guided by a "financial accelerator", as in the model by Bernanke, Gertler and Gilchrist (1999): namely, an amplification mechanism whereby shocks to the value of collateral or of banks' equity triggers changes in banks' supply of credit, which in turn affect the value of collateral or equity. Insofar as firms' ability to borrow depends on the market value of their collateral, an increase in asset prices expands their borrowing capacity and allows them to expand investment. The surge in economic activity increases asset prices further, leading to a feedback loop of rising asset prices, expanding balance sheets, looser

[4] A good example of the banks' entry-deterring power is the foreclosure of the credit market to pension funds by Dutch banks before the introduction of the euro. Until 1990, the Dutch private market for non-listed debt (*onderhandse markt*) was bigger than the official bond market, and historically Dutch pension funds provided a substantial share of its funding "privately" to central and local government, and to a lesser extent to companies (because this requires a credit risk management department) – a problem that pension funds partially resolved by co-investing with a bank. However, due to aggressive pricing by pension funds, the banks lost market share in the private debt market (Lenior (1999)). In response, banks refused to co-invest with pension funds, and thus effectively barred pension funds from lending privately to companies.

credit supply and further expansion in real activity. When a negative shock hits, the whole process reverses sign. Hence, even a small change in financial asset prices may produce large swings in credit and real economic activity. This amplification mechanism is exacerbated by the fact that changes in asset prices also affect the net worth of banks' equity (Adrian and Shin (2010)).

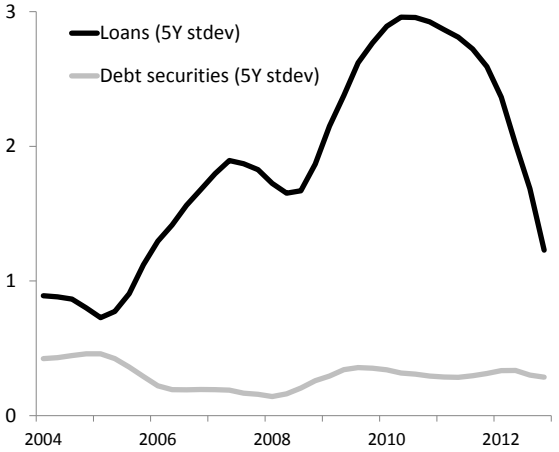
The financial accelerator is based on the ability of banks to leverage up collateral and their own equity. No such amplification mechanism would arise if firms were to finance their investment directly via the issuance of equity. When their value increases, firms might still increase their leverage by issuing bonds, but this would avoid further leveraging by banks. Hence if securities market financing were dominant, the financial accelerator would be far less potent. Recent work by Gambacorta, Yang and Tsatsaronis (2014) lends support to this view, particularly in periods following banking crises.

Figure 28: NFCs' financing in loans and debt securities in the Euro Area
(four-quarter moving sums of flows, as % of GDP)



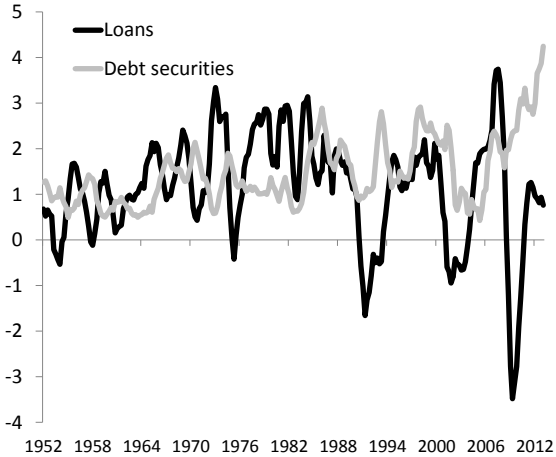
Source: ECB (Euro Area "Flow of Funds" Accounts). The chart plots the year-on-year change in NFCs' outstanding external liabilities (broken down as loans and debt securities) divided by nominal GDP. Loans excludes intra-NFC loans.

Figure 29: Standard deviation of NFCs' external financing in the Euro Area
(rolling 5 year window)



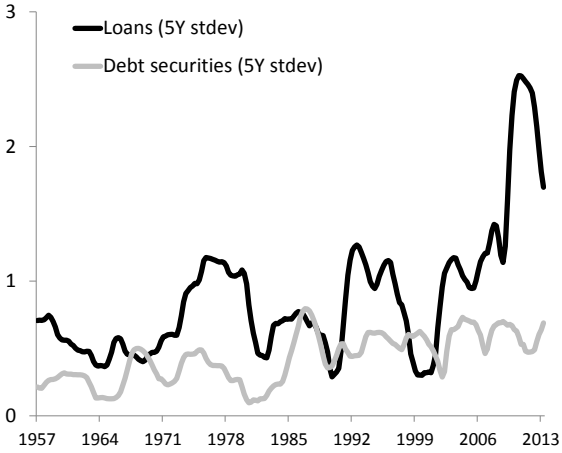
Source: ECB (Euro Area "Flow of Funds" Accounts).

Figure 30: NFCs' financing in loans and debt securities in the US
(four-quarter moving sums of flows, as % of GDP)



Source: Board of Governors of the Federal Reserve System (flow of funds accounts of the United States). The chart plots the year-on-year change in NFCs' outstanding external liabilities (broken down as loans and debt securities) divided by nominal GDP. Loans consists of balance sheet items (1) depository institution loans and (2) other loans. Debt securities include corporate bonds and commercial paper.

Figure 31: Standard deviation of NFCs' external financing in the US
(rolling 5 year window)



Source: Board of Governors of the Federal Reserve System (flow of funds accounts of the United States).

Financial structure and growth: Bringing new evidence to an old debate

This section presents evidence that bank-based financial structures tend to prevail in countries with lower long-run growth, controlling for other factors. To do this, we perform a faithful replication of Levine (2002), using more recent data and an expanded sample of countries.

Levine finds that financial structure is irrelevant for growth. This finding is based on cross-country OLS regressions of the form $G = \alpha X + \beta S + \varepsilon$, where *G* is the real per capita long-run growth rate, *S* is a measure of financial structure, and *X* represents a vector of control variables. In Levine's regressions, β is found to be insignificant – based on data spanning 1980-1995 (before the acceleration in banking systems' size noted in Section 1).

We update Levine's work using a World Bank dataset, with yearly observations from 1989 to 2011. To replicate Levine's regression (reported in Table IV in Levine (2002)), we compute $Structure = \log(\frac{Total\ value\ traded\ ratio}{Bank\ credit\ ratio})$ for each country-year from 1989-2011, where the *total value traded ratio* is the value of domestic equities traded on domestic exchanges divided by GDP, and the *bank credit ratio* is the value of deposit money bank credits to the private sector as a share of GDP. Following Levine's paper, our regression uses the mean of these yearly observations.

Table 3 reports the results. Contrary to Levine's results from 1980-1995, we find that the coefficient of the variable *Structure* is positive and significant at the 5% level in the new dataset. This result holds across all four specifications, which control for an increasing number of explanatory variables. The result is robust even in column IV, which has a smaller sample size owing to data availability. Moreover, results are robust to numerous sample selection choices. The coefficient of the financial structure variable remains positive even if observations over the financial crisis (2007-11) are excluded from the regression.

The economic interpretation of these results is that a one-standard-deviation increase in *Structure* relative to the mean is associated with a 7.7% increase in the growth rate (taking results from column III). This equates to an additional 0.15 percentage points of annual growth for a country with a long-run growth rate of 2%. Over decades, this amounts to a sizeable effect. Based on these results, if Germany's financial structure had followed that of the US over the past 20 years, the level of Germany's GDP would now be approximately 2% higher.

Gambacorta, Yang and Tsatsaronis (2014) uncover the economic mechanism behind our results. Based on a dataset covering 71 economic downturns in a sample of 24 countries over 1960-2013, they find that – on average – bank-based and market-based systems perform similarly during economic downturns. Crucially, however, bank-based systems tend to perform much worse (on average, three times worse) during downturns which occur at the same time as a financial crisis. Recoveries following such downturns are also more tepid in bank-based systems.

This finding is consistent with the "dark sides" of banking (discussed above). In particular, excessively volatile bank credit supply feeds back onto the real economy, exacerbating the business cycle and thereby hurting potential economic growth, partly because deep recessions have large "scarring" (hysteresis) effects (Ball (2009); Ouyang (2009)) and partly because firms may be reluctant to invest in the presence of high uncertainty regarding future credit availability (Dixit and Pindyck (1994)). The hold-up problem magnifies the real consequences of this effect, by misdirecting scarce credit towards unprofitable projects.

Table 3: **The empirical relationship between economic growth and financial structure**

	DV: Growth in real GDP per capita, 1989-2011			
	I	II	III	IV
Structure	0.112**	0.107**	0.104**	0.069**
	(0.0543)	(0.0480)	(0.0506)	(0.0270)
GDP in 1989	-0.259**	-0.316**	-0.318**	-0.114
	(0.102)	(0.133)	(0.133)	(0.0705)
Inflation		-0.185**	-0.187**	-0.0645
		(0.0817)	(0.0808)	(0.0415)
Government size		-0.0908	-0.0905	-0.364**
		(0.230)	(0.230)	(0.156)
Trade		0.0314	0.0252	0.175***
		(0.129)	(0.128)	(0.0551)
Legal rights			0.0301	0.111
			(0.119)	(0.113)
Financial reform				-0.471
				(0.357)
Secondary education				0.0365
				(0.133)
Constant	3.118***	4.096***	4.086**	1.616**
	(1.046)	(1.531)	(1.551)	(0.771)
Observations	85	84	84	46
R-squared	0.209	0.281	0.281	0.588

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Specification: All specification choices follow Levine (2002). OLS regression. Following Levine (2002), we use heteroskedasticity-consistent standard errors. These robust standard errors are shown in parentheses.

Description of dependent variable: The dependent variable is the growth in real GDP per capita over 1989-2011.

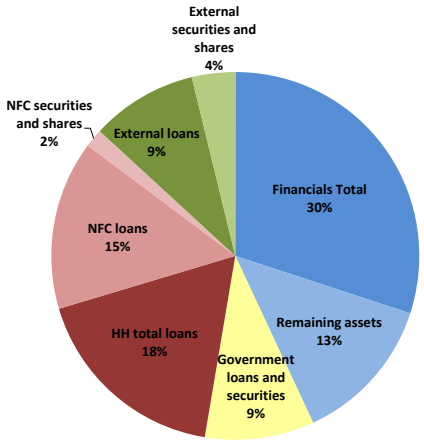
Description of independent variables: "Structure" is the logarithm of the total value traded ratio (domestic equities traded on domestic exchanges divided by GDP) divided by the bank private credit ratio (financial intermediary credits to the private sector as a share of GDP), averaged over 1989-2011. "GDP in 1989" is the logarithm of real GDP per capita (in US$) in 1989. "Inflation" is the logarithm of one plus the average of year-on-year consumer price inflation over 1989-2011. "Government size" is the logarithm of government expenditure as a share of GDP, averaged over 1989-2011. "Trade" is the logarithm of international trade (exports plus imports) as a share of GDP, averaged over 1989-2011. "Legal rights" is the logarithm of an index of the strength of legal rights (where a high value represents strong legal rights), averaged over 1989-2011. "Financial reform" is the logarithm of average financial liberalisation over 1989-2005, which is an index where higher values represent greater financial liberalisation. "Secondary education" is the logarithm of the proportion of the labour force with a secondary education, averaged over 1989-2011. All data are from World Bank, except "Financial reform" which is from Abiad, Detragiache and Tressel (2008).

Part C: Banks' excessive non-bank activities

EU banks hold €42tn of assets. But what types of assets do they hold?

The aggregate balance sheet of monetary financial institutions (MFIs) in the euro area reveals a striking picture (Figure 32). More than a quarter of the sector's assets is represented by claims on other financial firms in the euro area. A further 9% of assets are claims on governments; 13% are "remaining assets", which mostly comprises derivatives. 13% of MFIs' assets are claims on non-euro area residents. Credit to households and firms in the euro area amounts to just 31% of MFIs' assets.

Figure 32: Euro Area MFIs' asset breakdown by sector and asset class (in 2013 Q3)



Source: ECB (BSI). Note: MFIs' assets are unconsolidated.

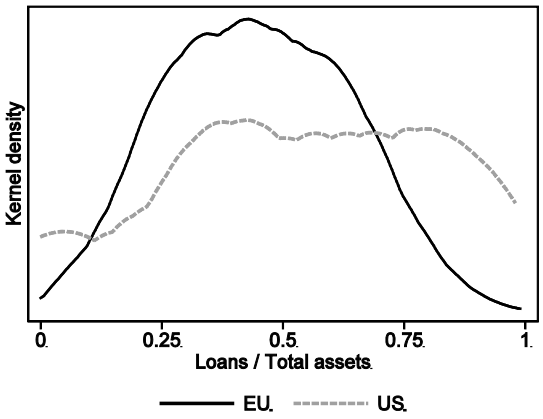
The asset breakdown of the "aggregate bank" in the euro area is representative of many individual EU banks. There are almost no pure investment banks in the EU; likewise, few EU banks are "narrow" banks, specialising only in retail or investment banking. This is shown in Figure 33: in the EU, the weighted distribution of banks' loans-to-total assets (LTA) ratios has an inverted U-shape, revealing that most assets are held by universal banks, with intermediate LTA ratios. In comparison, the distribution of US banks' LTA ratios is more uniform, conveying the greater importance of both investment banks and retail banks across the Atlantic.

The *raison d'être* of universal banks

Why do universal banks exist? Their economic *raison d'être* – and that of conglomerates generally – is the presence of efficiency gains: i.e. "revenue efficiency" (e.g. from cross-selling) and "cost efficiency" (such as scope economies in production).

Examples of such efficiency gains often arise in the real economy. For example, a petrol filling station might be able to improve its "revenue efficiency" by integrating horizontally with a chain of restaurants, so as to offer its customers meals when they refuel their cars. The same petrol filling station might be able to improve its "cost efficiency" by integrating vertically with an oil refinery.

Figure 33: Distribution of EU and US banks' loan-to-assets ratios in 2012



Source: Bankscope. The L/TA distribution is weighted by banks' total assets. The sample includes the universe of banks recorded in the Bankscope database in 2012: that is, 2,279 banks in the EU and 2,678 banks in the US. This sample excludes subsidiaries and branches of foreign banks.

Why must these very different facilities (filling stations, restaurants, oil refineries) be owned by a single firm in order for efficiency gains to be realised? As in Coase's theory of the firm (1937), conglomerates are born out of savings on market trading costs. Such transaction costs might otherwise arise from inter-firm information asymmetries (e.g. moral hazard problems), counterparty risk, or coordination

problems. In our example, vertically and horizontally integrated filling stations internalise these market trading costs by locating where people want to dine, and where there is a reliable supply of petrol of the appropriate quality.

Universal banks are analogous to the "horizontal integration" of filling stations and restaurants. Dispensing petrol and serving food are different facilities; likewise, writing loans and underwriting securities are different facilities. Supplying credit to households and firms entails acquiring soft information in order to screen and monitor borrowers' creditworthiness. Underwriting, holding and trading marketable securities is based on hard, proprietary and highly quantitative information. Investment banks' inputs are financial engineers, salespeople, computers, programmers, and a global network of front offices; retail banks' inputs are loan officers and an extensive branch network. However, revenue efficiencies may arise if some of the bank's customers need both credit and investment banking services. Cost efficiencies may arise where some infrastructure inputs (information technology, branches, back office, and so on) are common to both types of services.

The extent of revenue and cost efficiencies – whether in filling stations or in banks – is an empirical question. Much research has explored whether conglomerates trade at a discount relative to standalone firms – that is, whether conglomerates' equity tends to be valued less than the sum of its parts. On the whole, the evidence is ambiguous, partly because of difficult measurement and self-selection problems (see Maksimovic and Phillips (2008)). This ambiguity extends to financial conglomerates, as illustrated by two empirical studies with competing results.

- Laeven and Levine (2007) analyse data for banks from 43 countries for the period 1998-2002, and find that their market valuations are much lower than the counterfactual sum of their parts, controlling for possible self-selection bias. As such, they identify a "diversification discount": when a bank engages in multiple activities, e.g. lending and non-lending services, its market value is lower than if the bank were broken into separate financial institutions specialised in the individual activities. Their results are consistent with the presence of greater agency problems in diversified financial conglomerates than in standalone intermediaries, imposing costs which are not compensated by economies of scope.

- Vander Vennet (2002) analyses universal banks' cost and revenue efficiency gains, using data on 2,375 EU banks in 1995. He finds that universal banks are more "cost efficient" in providing non-traditional banking services, such as securities business. However, he finds no evidence that universal banks are more "cost efficient" in providing traditional banking services. There is some evidence that universal banks are more "revenue efficient", but this evidence is not robust across all specifications.

The social costs of universal banks

Vander Vennet's finding that universal banks are more cost efficient than specialised investment banks or brokerage houses in providing non-traditional banking services could reflect genuine cost savings. Universal banks might benefit from lower average fixed costs arising from information technology, human resources, buildings, etc. However, the finding could also reflect market distortions. Universal banks' securities trading activity is likely to thrive on lower funding costs owing to (i) state-sponsored deposit guarantees that are not priced according to risk; (ii) a higher probability of government support for creditors in the event of bank distress; and (iii) privileged access to central bank secured funding.

In other words, even if universal banks were found to be privately efficient compared with more narrowly focused intermediaries, they might still be socially inefficient if their cost advantage stems from public subsidies, and these subsidies induce such banks to take too much risk. More specifically, the social concern arises from universal banks' ability to subsidize their investment bank operations using the public subsidies notionally attached to their retail bank operations (namely deposit guarantees, creditor guarantees, and privileged access to central bank funding). This subsidy-transfer is likely to encourage universal banks to oversupply investment banking services, as well as to engage in excessive risk-taking through securities underwriting, proprietary trading and interbank lending.

By taking large exposures and excessive risk in securities markets, universal banks reinforce the links between asset price shocks and the supply of credit, and ultimately real economic activity. In other words, they exacerbate the financial accelerator mechanism modelled by Bernanke, Gertler and Gilchrist (1999). A drop in securities prices will hit universal banks both on the asset and on the liability (or funding) side: insofar as they hold marketable securities, the price drop will reduce universal banks' market value and therefore the value of their equity; insofar as they depend on the issuance of these securities to fund their activities, asset price drops raise universal banks' cost of capital. Hence, such banks would be induced to deleverage and sell assets in order to meet capital requirements. But, as they do so, they put further pressure on securities prices, generating a feedback mechanism that would not exist if banks were not exposed to securities markets on the asset side and dependent on them on the funding side. This mechanism can exacerbate systemic risk, and thereby create costs for society, especially if universal banks are large and are exposed to correlated security risks.

We analyse the relationship between universal banks and their social costs. Empirical analysis requires proxies of both of these variables.

- To proxy universal banks' business models, we look at a bank's loans-to-total assets ratio. Business models are of course not completely captured by this single variable – for example, a universal bank typically has a higher share of wholesale funding, and its non-loan business covers a range of banking services. Nevertheless, the LTA ratio is a good proxy for banks' business models, broadly defined. Table 4 shows the LTA ratio for selected banks in 2012. Banks with low LTA ratios (e.g. Deutsche Bank at 20%) correspond to those banks which are typically thought to be "universal"; banks with higher ratios (such as Svenska Handelsbanken at 69%) are typically thought to have a narrower retail focus.

Table 4: Loans-to-total assets ratios of selected banks in 2012

Bank	LTA
Credit Agricole	18%
Deutsche Bank	20%
Barclays	29%
Societe Generale	29%
UniCredit	60%
Erste Group	62%
CaixaBank	65%
Svenska Handelsbanken	69%

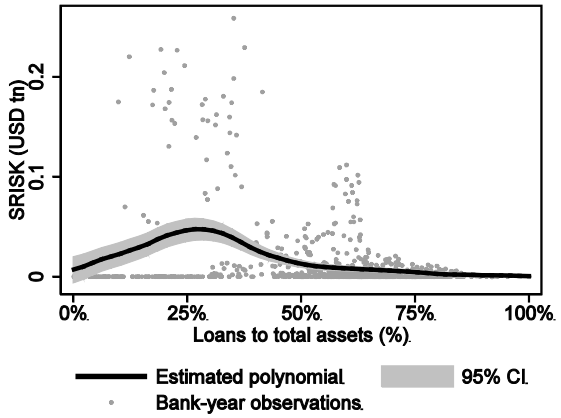
Source: Bloomberg.

- To proxy social cost, we use a market-based estimate of the amount of equity capital which an individual bank would need to raise in the event of a system-wide stress. More specifically, we use an estimate of the capital shortfall that banks are expected to incur in a financial crisis, based on work by Brownlees and Engle (2012) and Acharya, Engle and Richardson (2012). Though produced from publicly available information, this estimate (labelled "SRISK") is

conceptually similar to those obtained via stress tests carried out by US and European regulators, and takes into account the conditional correlation between the value of each bank's assets and the whole financial sector in a crisis. SRISK is a good proxy for potential social costs because it measures both the systemic risk to which banks are exposed and banks' contribution to overall systemic risk. However, SRISK may underestimate the total social costs of universal banks. For example, universal banks might have conflicts of interest which increase the likelihood that they engage in market manipulation (such as inaccurate Libor submissions), even though such manipulation might not exacerbate the financial accelerator mechanism or increase systemic risk.

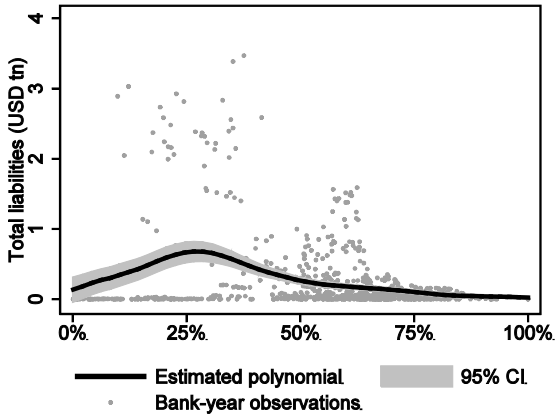
Figure 34 plots the statistical relationship between the LTA ratio and SRISK for a pooled cross-section of 107 listed EU banks observed yearly over 2000-12. The estimated polynomial regression reveals that the bivariate relationship is non-linear: universal banks with low LTAs around 10-40% tend to have much higher SRISK than narrow retail banks with high LTAs. However, much of this bivariate relationship is linked to the fact that universal banks with low LTAs tend to be much larger than other banks (Figure 35). Size is one of the key factors behind banks' SRISKs, and is therefore an important intervening variable to include in a multivariate set-up.

Figure 34: Loans-to-total assets and SRISK



Sources: Bloomberg.

Figure 35: Loans-to-total assets and size



Sources: Bloomberg.

To control for the effect of size, we estimate a multivariate OLS regression in which the dependent variable to be explained is the log of bank-level SRISK. Our control variables are bank size (i.e. the log of a bank's total liabilities) and the leverage ratio (i.e. the book value of equity divided by the book value of assets). To identify universal banks, we define a dummy variable which is equal to one if a bank has an LTA ratio between 10% and 40%, and zero otherwise. The regression is estimated on a dataset with an unbalanced panel structure, with observations on 107 EU banks for each year between 2000 and 2012.

Table 5 reports the results of this regression. In column I, the coefficient of the universal-bank dummy is positive and significant: universal banks have higher SRISK, irrespective of the fact that they also tend to be larger. In addition, the estimated parameters on both control variables have the expected sign: larger banks tend to have higher SRISK, while banks with more equity as a proportion of their assets have lower SRISK on average.

Table 5: **Universal banks' contribution to systemic risk**

DV	SRISK	
	No interactions	Interactions
	I	II
Universal-bank dummy	0.262***	-0.854**
	(0.082)	(0.427)
Log of total liabilities	1.026***	1.009***
	(0.017)	(0.020)
Equity-to-asset ratio	-3.960***	-3.945**
	(1.408)	(1.514)
Log of total liabilities × universal-bank dummy		0.096***
		(0.028)
Equity-to-asset ratio × universal-bank dummy		-1.748
		(4.496)
Constant	-3.400***	-3.220***
	(0.240)	(0.273)
Observations	582	582
R-squared	0.885	0.886

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Specification: OLS regression with robust standard errors.

Data: Unbalanced panel of 107 listed EU banks, observed yearly, 2000-2012.

Description of dependent variable: "SRISK" is the log of an estimate of the quantity of equity capital required to recapitalise a bank in the event of system-wide stress (source: NYU V-Lab), based on work by Brownlees and Engle (2012) and Acharya, Engle and Richardson (2012).

Description of independent variables: "Universal-bank dummy" is a dummy variable which takes the value of 1 when a bank has a loans-to-total assets ratio between 10% and 40%, and 0 otherwise (source: Bloomberg). "Log of total liabilities" is the log of a bank's total liabilities (source: Bloomberg). "Equity-to-asset ratio" is the book value of equity divided by the book value of assets (source: Bloomberg).

In column II, the universal-bank dummy is interacted with both size and the leverage ratio. In this specification, the coefficient on the universal-bank dummy on its own turns negative. However, the coefficient on the universal-bank dummy interacted with the log of total liabilities is positive and significant. As we shall see in Figure 36, this "slope" effect dominates the "intercept" effect (i.e. the negative coefficient on the universal-bank dummy) over most of the bank size distribution. In other words: it is not universal banking *per se* that increases a bank's systemic risk contribution, but universal banking in combination with large size. Moreover, banks with less equity as a proportion of their assets are more systemically risky, regardless of whether the bank has a universal or narrow business model.

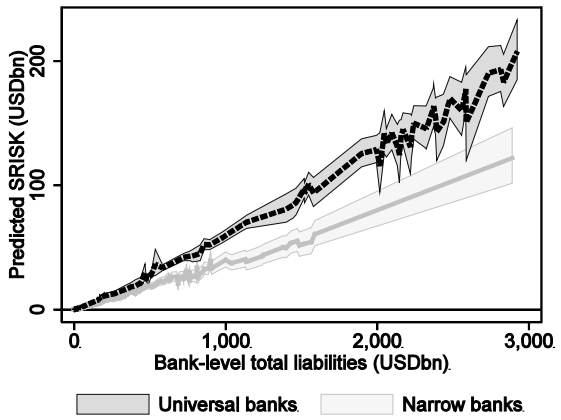
Table 5 estimates the average marginal effects of each variable. As such, the results do not exclude that some narrow banks might be systemically risky. For example, in the US, Goldman Sachs and Morgan Stanley – historically both investment banks – are consistently ranked among the top five systemically risky US banks. Lehman Brothers (another investment bank) triggered considerable financial stress following its bankruptcy in September 2008. These individual observations do not contradict our finding that – on average – large universal banks are more systemically risky.

The economic importance of the social costs of universal banking

To provide an indication of economic importance, Figure 36 shows the predicted SRISK for a range of observations on independent variables, based on the estimated coefficients shown in Table 5, column II. Figure 36 underlines that both size and business models are correlated with a bank's exposure and contribution to systemic risk. First, both lines have a positive slope: predicted SRISK rises as size increases. Second, the slope of the black line (representing universal banks) is always greater than the slope of the grey line (representing narrow banks), owing to the positive coefficient on the interaction between size and the universal-bank dummy.

An example helps to appreciate the magnitude of the economic importance. For a median-sized bank with US$31bn of liabilities, the predicted SRISK is US$1.2bn if the bank is "universal", and US$1.1bn otherwise. The additional SRISK posed by a universal bank in this case is US$0.1bn. By contrast, a large bank with liabilities of US$500bn has a predicted SRISK of US$28bn if the bank is "universal", and US$19bn otherwise. The incremental effect becomes much bigger: US$9bn. For a very large bank with total liabilities of US$3,000bn, the model predicts that the incremental effect of a universal-bank business model on SRISK is US$85bn. To put this number in context, the largest EU bank – HSBC, with total assets of US$2,692bn – had a market capitalization of around US$191bn in 2013.

Figure 36: Predicted SRISK of universal versus narrow banks (from Table 5, column II)



Source: Own calculations (see Table 5, column II). The lines show the point estimates, and the shaded areas show the 95% confidence intervals (for universal banks and narrow banks).

The average social cost – as proxied by SRISK – posed by large universal banks is therefore substantial. In comparison, evidence for private efficiency gains within universal banks is ambiguous. On balance, therefore, the preponderance of universal banking in Europe appears to be socially harmful, in the sense that its social costs far outweigh any private benefits.

Section 3: *Etiology*: Why Has Overbanking Occurred?

The extraordinary expansion of the European banking system documented in Section 1 raises serious concerns on several fronts, as backed up by the evidence in Section 2.

Which economic factors were responsible for the excessive growth of Europe's banking system, and particularly of its largest banks? In this section, we identify three key causes: (i) public support for banks and inadequate prudential supervision; (ii) political support for banks, encouraging them to over-expand; and (iii) technological innovations and increased competition in banking. It is important to understand not just how each of these factors might have contributed to overbanking, but also why they have had such a particular impact in Europe over the past 20 years compared with other geographic areas and with other periods.

Part A: Public bank support and inadequate prudential supervision

Banking is plagued by severe moral hazard problems. Insofar as banks borrow from a large pool of unsophisticated and dispersed depositors, banks' shareholders and managers have the incentive to engage in risk-shifting. This incentive is further enhanced by the opacity of banks' assets. These sources of moral hazard, coupled with banks' intrinsic fragility stemming from maturity transformation, explain why public policy typically protects depositors via insurance schemes; subjects banks to prudential regulation and supervision to curb their risk-taking incentives; and requires equity buffers to absorb potential unexpected losses.

However, deposit insurance schemes may themselves generate moral hazard. Capital requirements can often be circumvented by banks, especially the largest ones, which have greater capacity to engage in risk-weight manipulation (see Section 1). Moreover, banks that manage to grow so large and interconnected that their collapse would threaten systemic stability can expect their creditors to be bailed out by the government in the event of distress: they become "too big to fail" (TBTF).

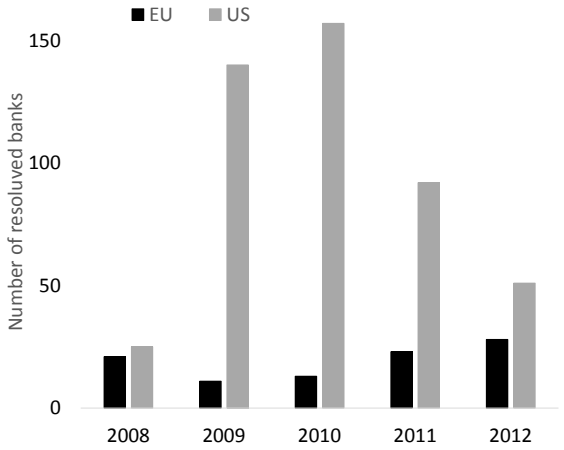
These public guarantees provided to the creditors of TBTF banks may prompt bank managers to pursue size as an objective *per se*, in order to become systemically important and extract private rent from the public subsidies (Roe (2014)). Managers can expand their banks quickly in a variety of ways: (i) by expanding easily scalable activities, such as housing loans; (ii) by acquiring other banks or merging with them; or (iii) by proprietary investment in securities. While expanding, bank managers place relatively little weight on risk-taking concerns. There is substantial evidence that banks significantly decreased their lending standards and relaxed their internal risk controls[5] in the run-up to

[5] Several episodes indicate that risk management internal controls have become less effective in large banks. For example, see the trading losses incurred by Société Générale in January 2008, and by JP Morgan in the 2012 "London Whale" episode.

the crisis. The scope for banks' expansion and risk-taking was boosted by financial deregulation[6] and securitisation[7] and loose monetary policy[8] until 2007.

These factors are not specific to Europe: they therefore cannot explain Europe's peculiarity. What is special about Europe?

Figure 37: Bank resolution in the US and EU



Source: FDIC and Open Economics. US data count the number of banks which failed and for which the FDIC was appointed receiver. EU data are from Open Economics, and count the total number of banks which failed (in a broad sense). EU data therefore include distressed mergers and part nationalisations; US data do not.

One possible explanation is that European governments have granted more support to distressed banks, especially large ones, than the US government, implying a more serious moral hazard problem. Indeed, national supervisors in the EU appear to have been far less inclined to shut down and liquidate distressed banks than the FDIC in the US, which has acquired a reputation for swift and efficient bank resolution. This transatlantic discrepancy is highlighted by Figure 37, which shows that far fewer EU banks have failed since 2008 compared with the number of banks that have been resolved by the FDIC in the US. A low propensity to resolve distressed institutions suggests a greater degree of regulatory forbearance by supervisors towards undercapitalised banks.

An IMF study by Lambert and Ueda (2014) quantifies the implicit government subsidy received by US, UK and euro area banks as a result of TBTF implicit bailout guarantees. They find that the magnitude of this subsidy has declined somewhat from crisis peaks, but that it remains substantial, especially in the euro area. This is captured in Figure 38, which shows the average benefit (in terms of reduced funding costs) for banks in receipt of government support. Importantly, euro area banks continue to benefit from a greater reduction in funding costs owing to government support than US or even UK banks. This reflects both the generally weaker state of euro area banks' balance sheets, but also differences in policy (e.g. bank resolution) frameworks. Moreover, Lambert and Ueda (2014) find that bank subsidies are more evenly distributed across banks in the euro area. By contrast, bank subsidies in the US tend to be more directly targeted at systemically important banks.

Rather than resolving distressed banks, European authorities have often preferred to rescue them by favoring acquisitions by (or mergers with) other domestic banks. Over the financial crisis, there are many examples of national governments and supervisors facilitating distressed mergers or

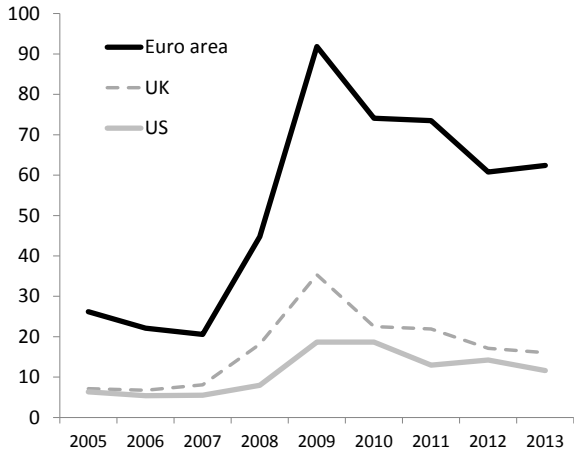
[6] Examples of deregulation that allowed the expansion of credit in the US are: (i) the 2001 decision by the FDIC to lower from 8% to 1.6% the capital requirement on banks for mortgage-backed securities and most private sector collateralised debt obligations (compared with the 4% requirement for mortgage loans and lower-rated mortgage securities); and (ii) the 2004 SEC decision to exempt investment banks from capital regulations and entrust their risk monitoring to their own internal risk models.

[7] For evidence on the effect of securitisation on banks' lending standards, see Rajan, Seru and Vig (2010), Keys, Mukherjee, Seru and Vig (2010), Adrian and Shin (2010), Dell'Ariccia, Igan, and Laeven (2012), and Jiménez, Ongena, Peydró and Saurina (2014).

[8] As mentioned in Section A, a substantial body of evidence indicates that, before the financial crisis, low interest rates encouraged banks to make larger and riskier bets in a "search for yield": see Dell'Ariccia, Igan, and Laeven (2012), Maddaloni and Peydró (2011), and Jiménez, Ongena, Peydró and Saurina (2014).

acquisitions, despite concerns regarding excessive concentration and lack of competition.[9] Between August 2008 and February 2014, the EU Commission received 440 requests from EU member states to provide state aid to financial institutions. The EU Commission did not object to the vast majority (413) of these requests, although state aid approvals often entail bank restructuring requirements, which in some cases are substantial (EU Commission (2011)).

Figure 38: Average reduction in funding costs owing to government guarantee (basis points)



Source: Lambert and Ueda (2014). The data are taken from their Figure 3.10. The estimate of the reduction in funding costs owing to government guarantee is based on a ratings-based approach. The difference between issuer ratings and stand-alone (financial strength) ratings captures the rating uplift due to government support. This rating uplift is translated into a funding cost advantage based on historical relationships between ratings and bank funding costs (Soussa, 2000).

This "lack of exit" induced by public support of distressed and unprofitable banks helps to explain simultaneously three aspects of overbanking in the EU: the rapid growth in the size of the banking system, in its concentration, and in the leverage of its largest banks. Moreover, insofar as it worsens the moral hazard problem of banks, this strong government support is likely to correlate also with greater risk-taking: Marques, Correa and Sapriza (2013) find that the intensity of government support is positively related to measures of bank risk taking, especially over 2009-10. Thus, public support accords with all the dimensions of overbanking highlighted in the previous sections.

What can explain the greater public support to distressed banks in EU, compared with the US? One can think of several reasons:

1. In Europe, the ties between politics and banks are in some ways closer than in the US. We discuss the role of politics in banking in the next section.

2. The US's legal and institutional tradition of bank resolution is long and strong. Since its creation in 1934, the FDIC has resolved 4,063 banks, of which 3,471 have resulted in outright bank failures, and just 592 in FDIC-assisted mergers. By contrast, the EU's track record in bank resolution is almost non-existent. Under the UK's Special Resolution Regime created in 2009, just two small banks have been resolved (Dunfermline and Southsea). The EU Directive on Bank Recovery and Resolution (and the Single Resolution Mechanism for euro area banks) is expected to enter into force in 2015. The lack of such legal tools in the pre-crisis era may have

[9] For example, Banco di Napoli, a distressed publicly-owned bank, was sold by the Italian government in 1997 for a nominal sum to Banca Nazionale del Lavoro and Istituto Nazionale delle Assicurazioni, and resold in 2002 by these banks to the Sanpaolo IMI (which later merged with Banca Intesa). Similarly, the UK Treasury facilitated the merger of Lloyds with the ailing HBOS in September 2008, overruling the competition concerns raised by the Office of Fair Trading by not referring the case to the Competition Commission. In 2008-09 the Irish government brushed aside the Irish Competition Authority to promote mergers among distressed Irish banks. Other examples have arisen following the crisis: once Spain's property bubble burst in 2008, many of the cajas that had funded the housing boom were distressed or insolvent. The Banco de España's rescue strategy was to merge them with other banks. Seven cajas merged into a single entity – Bankia – in December 2010.

contributed to the expectation that distressed banks would be bailed out, encouraging EU banks to expand aggressively.

3. Banking supervision in parts of Europe has been less effective than in the US. Until 2014, bank supervision in Europe was a national preoccupation – but the span of European mega-banks' operations was international. This mismatch impaired the effectiveness of national banking supervisors in the EU. Moreover, as suggested by Shin (2012), the earlier and more comprehensive take-up of Basel 2 in the EU (compared to the US) allowed EU banks to expand more aggressively, given excessively low risk weights on securitisation activity and the procyclicality of the Basel 2 framework.[10] In some countries, the sheer speed of banks' expansion may have outpaced national supervisors' ability to scale up their personnel and operations. A good case in point is that of Iceland: Benediktsdottir, Danielsson and Zoega (2011) describe how the country's financial supervision quickly became inadequate with the rapid expansion of Icelandic banks prior to 2007. The banks dwarfed the agencies that were supposed to supervise them.

4. In Europe, the universal banking business model is pervasive (see Section 2, Part C). Universal banks' securities trading arm can obtain funding at interest rates that reflect the public subsidies associated with their deposit-taking arm, increasing universal banks' incentive to take excessive risk in securities markets. The econometric analysis in Annex A4.2 of the Commission's report on implicit state guarantees to EU banks (EU Commission (2014a)) finds that the European banks that receive a larger implicit public subsidy are larger, riskier, more interconnected, less capitalised, and rely more on the wholesale market for funding. Universal banks' business models tend to be correlated with these features. Marques, Correa and Sapriza (2013) find that banks subject to more restrictions on the set of activities that they can perform were less likely to take on more risk during the financial crisis. Their evidence indicates that regulatory impediments to banks' ability to engage in activities involving securities markets, insurance, real estate and ownership of non-financial firms reduce the severity of the moral hazard problem associated with public subsidies.

5. In the euro area, the expansion of banking came on the back of the process of financial integration that accompanied and followed monetary unification. Lane (2013) and Lane and McQuade (2014) show that, before the crisis, international capital flows in the euro area were associated with abnormal expansions of credit and housing market bubbles in the "euro-area periphery". Core country credit flowed into Spain, Ireland and Greece, funding housing and consumption booms in these countries. It also flowed from Germany, Austria and Italy to fund a similar boom in eastern and central Europe. Likewise, the recent crisis has been associated with a sharp decrease in the degree of euro area financial integration.

Part B: Politics

Banks have a quintessentially symbiotic relationship with politics. Banks need the state, and the state needs banks, as argued by Calomiris and Haber's (2014) study of Britain, the US, Canada, Mexico and Brazil. So it is natural to look at politics as a possible cause of the European overbanking problem.

[10] Shin (2012) shows that EU banks expanded aggressively in US credit intermediation by making use of US shadow banking entities. US banks play no such role in EU credit intermediation.

In the previous section, we examined a channel through which public policy may induce both an excessive expansion of banks and excess risk taking: namely, the bailout of distressed TBTF institutions and regulatory forbearance by prudential authorities. In Europe, public policy has been quite lenient in this respect – a leniency that may be explained, at least partly, by European politicians' desire to avoid the traumatic social repercussions of closing down distressed banks.

However, it is hard to determine whether the greater generosity of state support to banks in the EU compared to the US can be traced to closer ties between banks and politics in the EU compared to the US. On the one hand, banks have been much more central in the European financial system than in the US since the second world war (Rajan and Zingales (2003)). Banks have reinforced their centrality by lobbying for favorable legislation. As European banks became more vital to the functioning of financial markets and to the economy, they increased their lobbying power vis-à-vis politicians, in order to oppose entry of competing financial institutions (see Section 2, Part B). On the other hand, recent literature has pointed to very close ties between banks and politics also in the US. Calomiris and Haber (2014) argue that the political support for mortgage subsidies and lax prudential regulation was the main cause of the relaxation of credit standards in the US before the crisis. Johnson and Kwak (2011) point to the connection between financial and governmental elites in the US as the source of weak regulatory oversight. Igan, Mishra and Tressel (2009) find that US banks with large lobbying budgets tended to expand their lending faster, engage in riskier lending and perform worse over the financial crisis. Rajan (2010) highlights that US governments (of both parties) backed the expansion of the role of Fannie Mae and Freddie Mac in the securitisation process (as documented by Acharya, Richardson, van Nieuwerburgh and White (2011)) as a way to broaden homeownership and thus attract political support from the lower and middle classes.[11]

But the effect of politics on banks' size and risk-taking may extend far beyond the implicit subsidy given by supporting distressed banks, or – as in the US – the explicit subsidy given to mortgage lending. In Europe, politics probably played a role in the overbanking problem via two additional channels: (i) support of "national champions", and (ii) politically connected bank management.

First, European governments have nurtured the birth and growth of mega-banks that could act as "national champions" in the competition with foreign banks – an attitude that Véron (2013) labels "banking nationalism". This policy ranges from the provision of preferential treatment by the government to the protection against foreign competition and against takeover bids by foreign banks. As Véron notes, "banking nationalism is often more potent than other forms of economic nationalism, because of the dense webs of relationships between banking sectors and governments" due to the key role that banks play in financing the domestic economy in general, and government operations in particular. Véron points out that this tendency of European governments has ironically been enhanced by European financial integration: as the protection afforded by national boundaries diminished, politicians felt that they had to facilitate domestic banks' quest for size, so as to be able to fend off

[11] There is evidence that in the US politics affected even the implementation of bailouts in 2008: using a sample of 571 firms, Blau, Brough and Thomas (2013) find that firms that lobbied or had other types of political connections were more likely to receive Troubled Asset Relief Program (TARP) funds and received a greater amount of support earlier than firms that were not politically involved.

foreign competitors (often on the basis of economies-of-scale arguments) and lower the contestability of their control.[12]

To some extent, the growth of large banks in the EU has been the physiological consequence of the process of European financial integration, rather than the outcome of "banking nationalism". In many cases, banks had to expand precisely to be able to operate efficiently across national boundaries, and often did so via foreign acquisitions. In fact, the physiological growth of banks across national boundaries has sometimes clashed with "banking nationalism", calling for EU Commission interventions against biases in favour of domestic banks. One such case arose in the context of the "Antonveneta affair". In 2005, the governor of the Bank of Italy, Antonio Fazio, was indicted for allegedly rigging the competition to take over an Italian bank, Banca Antonveneta. Published excerpts of tapped telephone calls suggest that Mr Fazio favoured an Italian bid, in order to sabotage a foreign bid from Dutch bank ABN AMRO, and in December 2005 the EU Commission brought legal action against the Bank of Italy.

A second channel through which politics has contributed directly to banks' excess risk taking via the control that politicians have over bank management in some EU countries, unlike in the US: in Germany and Spain local governments directly appoint some managers of savings banks, and in Italy they appoint the managers of banking foundations that have controlling stakes in the most important Italian banks. Hau and Thum (2009) provide evidence of a systematic underperformance of Germany's state-owned banks and relate this underperformance to the quality of bank governance, documenting that the magnitude of bank losses in the financial crisis are associated with board incompetence in finance. Similarly, Cuñat and Garicano (2009) show that the Spanish cajas whose chief executives had no prior banking experience and no graduate education (but did have strong political connections) extended more loans to real estate developers and fared substantially worse both before and during the crisis. The close connection between politicians and bank managers was also a factor in Spanish supervisors' regulatory forbearance during the crisis, and the banks' forbearance on bad loans to developers (Garicano (2012)). Similarly, in Italy the debacle of Monte dei Paschi di Siena – whose main shareholder is a foundation largely controlled by local politicians – originates from the botched acquisition of Banca Antonveneta in 2007, performed by the politically connected bank chief, Giuseppe Mussari.

Part C: Technology and competition

In the past, most studies on the technology of banks failed to find evidence of economies of scale. Berger, Hunter and Timme (1993) summarise the early literature by stating that "the average cost curve has a relatively flat U-shape, with medium sized firms being slightly more scale efficient than either very large or very small firms". They suggest (writing in 1993) that the maximum efficient scale is less than US$300m in total assets (approximately US$484m in 2013 dollars). By contrast, the largest EU bank (HSBC) had total assets of US$2,692,016m in 2013.

[12] A striking example of the importance of the political support to the expansion of domestic banks is that of Iceland in the pre-crisis years: Benediktsdottir, Danielsson and Zoega (2011) describe how the Icelandic government first privatised the banks by selling them to friendly businessmen (who took loans from those very banks to fund their stake acquisitions), and then jointly with these cronies carried out their plan of transforming Iceland in an international financial centre. A crucial ingredient in this plan was the implicit sovereign support that the Icelandic government gave to the banks' record borrowing in 2004-05: support that allowed them to access abundant funding in international markets at low interest rates.

More recent analytical contributions, which rely on updated data and more sophisticated techniques, find mixed evidence. Wheelock and Wilson (2012) use non-parametric techniques to estimate returns to scale for all US banks over the period 1984-2006, and find that as recently as 2006, most US banks faced increasing returns to scale. Hughes and Mester (2013) note that in estimating banks' scale economies, one must take account of the diversification gains resulting from larger scale. Using pre- and post-crisis data, they find large scale economies in a model that accounts for managerial risk preferences and endogenous risk-taking. However, Davies and Tracey (2012) argue that, after taking into account TBTF public subsidies, strong results on the existence of economies of scale disappear. The authors employ credit rating data to adjust the cost of debt by considering only the standalone rating of banks, rather than the rating including government support. Through this adjustment, they find that the banks' funding costs increase with size, lowering estimated economies of scale. In particular, they claim that there are no scale economies in a sample of large international banks with assets above US$100bn after correcting for the artificial funding cost advantage. According to their evidence, the efficiency benefits of scale are offset by diseconomies arising from the costs of managing very large and complex banks.

To some extent, technological changes may have increased the optimal scale of banks over the past decade. After 2000, large banks expanded into lines of business other than deposit-taking and credit origination, and expanded their securities trading and issuance activity. Amongst the largest 20 EU banks, the share in total assets of loans to non-financial firms decreased from 50% in 1996 to 40% in 2012, and the gap was more than filled by derivatives, which barely existed in 1996, but comprised nearly 20% of the largest 20 EU banks' total assets in 2012. The design and issuance of new financial instruments such as derivatives typically requires large investments in highly skilled human capital (such as financial engineers and sales personnel), data and software. However, once a product has been designed and priced, it can be sold to many clients. In other words, this activity is characterised by a natural monopoly technology. In such markets the "winner takes it all", and therefore *ex ante* banks have the incentive to overinvest in the production factors (labour and information technology) that are required to enter the market (see Admati and Hellwig (2013); Haldane (2012)).

The phenomenon of "excess entry" in industries that feature high fixed costs and negligible marginal costs is well-known in the industrial economics literature, which has highlighted that such excess entry entails two types of social costs. First, the number of firms entering the market is above the socially desirable number of firms. New entrants impose a negative externality on incumbents by stealing production from them, which increases average costs (see, for instance, Spence (1976a, 1976b), Dixit and Stiglitz (1977), von Weizsacker (1980), Perry (1984), Mankiw and Whinston (1986), and Sutton (1991)). The net effect on social welfare depends on whether the price reduction resulting from increased competition dominates the increase in average costs. A second source of social inefficiency arises from wasteful duplication costs, in which new entrants invest in entry costs already incurred by incumbent firms (see, for instance, Pesendorfer (2003)). These costs may be further increased by haste: if several banks want to develop a certain new derivative product very quickly, each of them will have to invest more money than they would have if they had gone more slowly. But each entrant bank places a greater value on developing the product quickly than society does: entry occurs too early and banks incur entry costs that are too high from a social point of view.

Section 4: *Therapy*: How Could New Policies Help?

Before turning to policy remedies, it is worth summarizing the main findings of this report. We began by showing that over the past 20 years (and particularly since 2000) in Europe the banking system has grown much more than elsewhere. European banks have also become considerably more concentrated, and have expanded into activities beyond traditional relationship lending. In particular:

- The European banking system has reached a size where its marginal contribution to real economic growth is likely to be nil or negative. It is associated with real imbalances such as over-investment in housing and diversion of talent from non-financial sectors. Bloated banking systems also tend to be riskier, both in terms of individual bank risk-taking and banks' exposure and contribution to systemic risk. As a result, bloated banking systems have the potential to cause and exacerbate banking and sovereign debt crises (Section 2, Part A).

- The large size of Europe's banking system also translates into a financial structure in which securities markets are less important in the financing of the real economy. Over the past 15 years Europe's bank bias has increased, bucking the global trend. This is a matter of concern because financial structures heavily skewed towards banking are associated with lower economic growth (Section 2, Part B).

- The universal bank business model – whereby a bank performs both traditional financial intermediation and securities market activities such as designing, underwriting, holding and trading marketable securities, especially derivatives – is widespread in Europe. Universal banking is generally justified on the basis of economies of scope, but is also likely to find its rationale in the ability of universal banks to operate in securities markets with funding costs that reflect their retail banking status. Public subsidies (deposit guarantees, creditor guarantees, and privileged access to central bank funding) give universal banks a competitive advantage over non-bank institutions. At the same time, the universal bank business model is a source of fragility, because it is associated with higher levels of systemic risk exposure and contribution at the bank-level, threatening systemic stability (Section 2, Part C).

Overbanking is not just a European problem: many of the symptoms associated with it are also present in other countries. And many of the factors that may have contributed to it, such as financial innovation and lenient prudential regulation, are present worldwide. Yet the evidence indicates that the situation has become particularly serious in Europe. Why?

Risk-taking incentives due to moral hazard may be higher in Europe because of greater perceived propensity of European governments to bail out "too big to fail banks", in turn due to the lack of crisis management and resolution tools in the pre-crisis era; more fragmented and less effective supervision; the pervasiveness of the universal banking model; and the process of financial integration. Moreover, in European countries the relationship between politics and banks has contributed to the emergence and abnormal growth of mega-banks because of politicians' propensity to rescue zombie banks by merging them with healthier ones and their desire to create and support "national champions" capable of withstanding Europe-wide competition. Politics may also have directly contributed to the excess risk-taking of banks, via the appointment of incompetent managers (Section 3).

The policy achievements so far

Recently, there have been several important innovations in EU financial policy. Over time, these policy innovations should improve the *status quo* described in this paper – particularly if competent authorities use the extra policy tools given to them. The economic implications of these innovations in financial policy are discussed in a recent paper by the EU Commission (2014b). Four policy innovations are particularly noteworthy from the perspective of this paper.

- In July 2013, the **fourth "capital requirements" legislative package** – comprising both a regulation (CRR) and a directive (CRD) – entered into force. This legislation brings to the EU the expected benefits of the Basel III agreement. Importantly, the legislation creates new legal powers for authorities to impose additional capital requirements. For example, authorities can impose an additional systemic risk buffer on all (or a subset of) banks: this buffer can be up to 3% of risk-weighted assets (from 2015), or even more than 3% under certain circumstances and with EU Commission approval. This systemic risk buffer is intended to "prevent and mitigate long term non-cyclical systemic or macroprudential risks" (Article 133 of the CRD) – such as the various systemic risks identified in this paper.

- In November 2013, the "**SSM regulation**" – conferring bank-supervisory powers on the ECB – entered into force. The Single Supervisory Mechanism creates a new system of financial supervision comprising the ECB and the national competent authorities of participating EU countries. From the perspective of this paper, the SSM will help to combat the "banking nationalism" which hitherto fostered national banking champions and contributed to the EU's overbanking problem.

- In April 2014, the European Parliament adopted a text of the **bank recovery and resolution directive** (BRRD), which was originally proposed by the EU Commission in June 2012. The BRRD will enable (from 2016) authorities to "bail-in" the eligible liabilities (including unsecured creditors) of banks subject to resolution. Authorities will have substantial powers to intervene *ex ante* in banks which are deemed irresolvable. This should help reduce the TBTF subsidy given to EU banks.

- In April 2014, the European Parliament adopted a text of a regulation establishing a **Single Resolution Mechanism** (SRM), which was originally proposed by the EU Commission in July 2013. The SRM implements the BRRD in the euro zone, and therefore will complement the SSM. As part of the SRM regulation, a Single Resolution Fund, financed *ex ante* by banks, will help to provide "bridge financing" for resolved banks – although this fund will not reach its target level (of 1% of bank deposits: about €55tn) until 2023.

In addition to these four policy innovations, the Commission's proposal (published in January 2014) for a regulation on "**structural reform**" of the EU banking system is currently subject to political discussions. The proposal aims to separate the lending activity of banks from their security trading activity, with the purpose to limit their risk exposure and control systemic risk. This proposal builds on the recommendations of the "Liikanen report", published in October 2012. The Commission's proposal would help to mitigate some of the concerns raised in Section 2 (Part C) of this paper.

The menu for new policies

These four key policy innovations – CRD, SSM, BRRD and SRM – are necessary steps towards a healthy banking system in the EU. Higher bank capital requirements owing to the CRD will reduce the probability of bank failure, while resolution powers stemming from the BRRD ensure that authorities will be able to respond in the event of bank failure. In the euro area, the establishment of the SRM is essential for the SSM to be effective: historically, one of the key impediments to effective prudential supervision in Europe has been the absence of crisis management and resolution policy tools.

Some policymakers feel that these four innovations are sufficient. At the very least, they say, lawmakers should wait several years to see whether the new legislative framework is adequate. But this complacent approach neglects the magnitude of the EU's overbanking problem (described in Section 2) and the stubbornness of its underlying causes (outlined in Section 3).

Recent work by IMF economists casts doubt on the hypothesis that the aforementioned policy innovations are sufficient (Lambert and Ueda (2014)). The study performs an event study to test how much the CDS spreads and stock prices of systemically important banks in the US, the UK, the euro area and Switzerland have reacted to recent policy announcements, such as the publication of the RRD and SRM proposals by the EU Commission. On the whole, both the CDS spreads and stock prices of euro area banks did not react significantly to these policy announcements by the Commission – in contrast with the impact on US and UK banks of comparable policy announcements by their governments.

We do not diminish the potency of the therapies applied so far by arguing that more needs to be done. Next, we list the novel (or insufficiently tried) structural policies that may complement existing policies. In some cases, these policies would imply that competent authorities "increase the dosage", using powers given to them by the CRD and BRRD; in other cases, these policies would require new laws from the EU's co-legislators or member states. This list is an outline of policies which could be tried: it does not constitute a precise set of recommendations.

Policies to reduce excessive private credit creation by banks and mitigate its risks

(i) **To curb excessive debt accumulation, EU member states could remove the preferential fiscal treatment of debt.** In many EU member states, debt is treated more leniently than equity by fiscal authorities. For example, interest payments on debt are often tax-deductible. This preferential fiscal treatment encourages all sectors to increase their leverage – including households, non-financial corporations and financial firms. Reducing preferential fiscal treatment of debt would reduce leverage across the whole economy, and thereby reduce its reliance on banks (as well as fixed income markets). In this sense, the policy innovation would target banks on their asset side. However, insofar as such a policy would also apply to banks directly, it would induce them to increase their equity, and hence become more resilient. Currently, when a bank issues debt, it incurs interest expenses that can be deducted against profits, reducing the overall tax bill. Hence, reducing or eliminating the tax advantage of debt compared to equity would also induce banks to recapitalize. Therefore, this policy would also induce them to deleverage, by acting on banks' liability side.

(ii) **To control the size of large banks, the EU could implement more aggressive anti-trust policy.** This would address both the problem of the size of the banking system as a whole, which largely arose from the growth of its largest banks, and the problem of its increasingly concentrated structure. It would also curtail national governments' tendencies to protect and nurture "national champions" to the detriment of foreign competitors. Such policies would operate in synergy with the creation of the Single Supervisory Mechanism (SSM), which already creates greater distance between the supervisor and the largest banks, compared to the *status quo ante*. Traditionally, EU competition policy has been only weakly applied to banks, except in some cases of conditional state aid approvals and cross-border acquisitions. This reflects the fact that the EU Commission has limited powers: unlike, for example, the UK competition authorities, the Commission cannot address market structure issues, intervening whenever it observes excessive market power. Moreover, unlike the US, the EU has no hard ceiling on the maximum size of a single bank.[13] Hence, a more aggressive antitrust policy is only possible if the powers of the Commission in this area are considerably strengthened.

(iii) **To increase banks' resilience, competent authorities in the EU could increase minimum capital requirements.** Relevant policy tools, created under the CRD IV package, include additional capital buffers for systemically important institutions and for long-term non-cyclical macroprudential risks. Leverage limits would also boost the resilience of banks and tame sophisticated banks' ability to game regulation. Countercyclical capital buffers – while primarily aimed at boosting the resilience of the banking system during times of rapid credit growth – will also help to mitigate the inherent pro-cyclicality of bank-based financial systems.

Policies to re-balance the EU's financial structure away from banks

(iv) **To develop non-bank credit supply, the EU could encourage intermediation by non-banks.** In particular, the EU could encourage the direct access of small- and medium-size firms to capital markets by lowering the fixed costs associated with that access – for example by allowing smaller firms to jointly issue mini-bonds or by encouraging securitization of their loans, as proposed by Giovannini and Moran (2013). Another possibility would be to allow non-bank intermediaries such as mutual funds and pension funds to provide debt financing to firms, placing such debt directly with their clientele. This provision of debt finance by institutional investors, which is already quite widespread in the US and is starting to appear also in Ireland, would also help to rebalance the heavily bank-based structure of the European financial system. However, this policy also poses delicate problems of potential regulatory arbitrage (which banks could also exploit, by setting up or funding non-bank intermediaries), unless these intermediaries are subject to additional regulation. The policy also poses issues of consumer protection and corporate governance, as the loans underlying the debt instruments sold by such intermediaries would be hard to evaluate for the funds' clients.

[13] US law prevents a bank from acquiring other banks after it has exceeded 10% of US deposits (see the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994). However, the law does not prohibit banks from exceeding the 10% ceiling through organic growth. Indeed, three (nearly four) US banks currently exceed the 10% threshold.

Policies to mitigate the risks from banks' "non-bank" activities

(v) **To reduce risks posed by banks carrying out "non-bank" activities, policy options include aggressive structural reform.** Some Member States have taken measures inspired by policy proposals advocating ring-fencing (the Liikanen report (2012) and the Vickers report (2011)) or full legal entity separation (the Volcker Rule). In January 2014, the EU Commission published a proposal for a regulation on the structural reform of the EU banking system, based on some of the recommendations of the Liikanen report. Reforming banks' structure might reduce both the size of the largest banks and their risk-taking in securities markets by imposing constraints on intragroup subsidies to securities trading activities within complex banking groups.

(vi) **Competent authorities could increase the risk weights applied to intra-financial system exposures, or reduce large exposure limits among financials.** This would reduce the largest banks' involvement in securities markets and therefore also curtail the bank-specific and systemic risks arising from their derivatives exposures. Reducing the largest banks' market-making and securities markets activities would reduce liquidity and trading volume in these markets. However, the current level of banks' activities in these markets reflects the existence of a public subsidy, which allows the large universal banks to fund their securities trades with cheaper credit than non-bank entities. Moreover, to some extent, the void created by the withdrawal of large banks from securities trading would be filled by non-bank entities, such as hedge funds.

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