# Bank bias in Europe: Effects on systemic risk and growth

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**ABSTRACT**

Europe's financial structure is extremely bank-based – far more so than in other advanced economies. We show that this "bank bias" is associated with greater systemic risk, in the sense of larger capital shortfalls in banks when asset prices fall sharply. Bank-biased countries also tend to experience lower economic growth rates, particularly during financial crises. This finding is robust to the endogeneity of financial structure, which we instrument with past reforms of financial regulation and characteristics of the structure of the real economy. We interpret these findings through the lens of the financial accelerator, which tends to be more violent in bank-biased countries. Banks misallocate funding in good times and ration it in bad times, leading to higher systemic risk and lower economic growth. The paper concludes by analysing public policies to reduce the bank bias in Europe's financial structure.

JEL Codes: G1, G2

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"Looking at our past experience, the absence of an alternative funding channel increased overall economic risk – because the bank lending channel got clogged. Better to have a plurality of channels financing the real economy than to rely on just one."

*ECB President Mario Draghi at the European Parliament on 17 November 2014*

## 1. EUROPE'S BANKING SYSTEM IN PERSPECTIVE

Europe is home to the world's largest banking system. The total assets of banks in the EU amounted to €42tn (334% of EU GDP) in 2013. By contrast, Japanese banks' assets added up to €8tn (196% of Japan's GDP), while US banks' assets were worth €11tn (88% of US GDP). Converting the US figure to international accounting standards would add €3.6tn,[1] and including the assets of Fannie Mae and Freddie Mac would add a further €3.8tn. All told, these additions would bring the US banking system to 149% of US GDP – still less than half of the relative size of Europe's banking system.

Europe's banking system has not always been extraordinarily large, as Figures 1 and 2 reveal. From 1880 until the 1960s, bank assets to GDP fluctuated around 70% in both the US and major western European countries. In the late 1980s, bank assets amounted to about 180% of GDP in Japan and major western European countries. Only since 1990 has Europe's banking system grown so much larger than its international peers.

***Insert Figure 1 here***

***Insert Figure 2 here***

Importantly, European banks' total assets expanded much faster than their loans to domestic non-financial firms and households. The ratio of European banks' assets to GDP has increased almost fivefold since 1980, while the ratio of their loans to GDP has increased about 2.5 times, according to data collected by Schularick and Taylor (2012). Hence, the extraordinary growth in European banks' balance sheets is largely accounted for by activities other than lending to the real economy – such as increases in securities holdings, including sovereign debt; derivatives trading; claims on other banks and financial companies; and claims on foreign entities.[2]

Why have Europe's banks grown so much? One possible explanation could be the contemporaneous rise in the wealth of European households, documented by Piketty and Zucman (2014).[3] Banks, and financial firms more generally, provide wealth preservation services to households. Gennaioli, Shleifer and Vishny (2014) build a Solow-style growth

[1] This €3.6tn adjusts for the underestimation of on-balance-sheet derivative positions by US local GAAP accounting standards compared to IFRS. To estimate this uplift, we extend Hoenig's (2013) calculations on G-SIB US banks to all major US banks with substantial derivatives books.
[2] Additional evidence on the size of Europe's banking system is presented in Pagano *et al* (2014).
[3] Between 1980 and 2010, private wealth to GDP rose from 230% to 354% in Germany, 261% to 461% in the UK, and 302% and 351% in the US.

model which captures this wealth preservation activity, and predicts that the size of financial intermediaries should grow in proportion to household wealth, rather than GDP.

However, the rise in European banks' assets has far outpaced the rise in private wealth, as shown in Figure 3. Between 1880 and 1950, the ratio of total bank assets to private wealth fluctuated around 17% in Germany, the UK and the US. After 1950, the ratio in Germany and the UK trended upwards, accelerating in the early 1990s, and reaching approximately 100% by 2011. Meanwhile, the US series remained flat at around 17%. The growth in household wealth therefore provides a reasonable explanation for the size of the US banking system, but it cannot account for the growth in bank assets in Germany and the UK.

***Insert Figure 3 here***

This enormous expansion of banking has rendered European countries' financial structures strongly bank-based. We characterise financial structure by the ratio of bank assets to the capitalisation of stock and bond markets, and label this a measure of countries' "bank bias". Bank bias was in decline in Germany and the UK in the late 1980s and early 1990s, but began to grow sharply from the mid-1990s, as Figure 4 shows. These trends are true also of the rest of Europe, as Figure 5 reveals. The culprit is the burgeoning size of the banking system – coupled with a stock market that has fluctuated but not increased in value, and a bond market which has barely grown. In contrast with these European trends, bank bias in the US has remained flat since 1995. Figure 6 shows that Europe's financial structure in 2011 was much more bank-biased in comparison not only with the US, but also with other developed economies such as Japan, Canada and Australia. Even developing economies such as Brazil and India have less bank bias than any European country except Sweden.

***Insert Figure 4 here***

***Insert Figure 5 here***

***Insert Figure 6 here***

Given the tight connection between financial systems and macroeconomic performance, it is natural to question whether Europe's increasing bank bias has affected the stability and growth of its economy. We explore this issue by asking two related questions. First, is the bank bias of a country's financial structure associated with greater systemic risk? Second, is economic growth in bank-biased countries lower and more sensitive to financial crises? In Section 2, we explain the rationale for these potential effects, based on theories of bank behaviour over the financial cycle. Sections 3 and 4 present and discuss empirical evidence regarding these two questions, and quantify the extent to which Europe's bank bias has contributed to systemic risk and affected economic growth in European countries.

As we shall see, Europe's bank bias has sizeable macroeconomic implications. Hence, it is instructive to explore why Europe's financial structure became so bank-biased

compared to other advanced economies, particularly since the mid-1990s. In Section 5 we argue that Europe's bank bias largely reflects political factors and policy choices. This suggests that different political attitudes and more enlightened policymaking could reverse the trend. Section 6 outlines specific policies that would reduce Europe's reliance on banks, and encourage, in the words of ECB President Mario Draghi, "a plurality of channels financing the real economy".

## 2. FROM A BANK-BASED TO A BANK-BIASED FINANCIAL STRUCTURE

Why do we use a pejorative term – "bank bias" – to describe Europe's bank-based financial structure? To answer this question, let us recap some of the theory regarding bank-based versus market-based financing.

In principle, a bank-based financial structure can be beneficial both for risk allocation and economic growth (Allen and Gale, 2000). By lending to illiquid but solvent borrowers, banks should enable firms and households to buffer idiosyncratic risks efficiently, thereby eliminating the impact of diversifiable risk on real economic decisions. A bank-based structure can also contribute to economic growth by improving access to finance. Banks are specialists at mitigating asymmetric information problems between lenders and borrowers (Boot, 2000). As a result, banks diminish adverse selection through the *ex ante* screening of borrowers, and reduce moral hazard by monitoring the firms' *ex post* investment decisions. Small firms, which typically have no access to securities markets owing to their modest size, are among the biggest beneficiaries of banks' information-processing role.

Security market participants do not have the same incentive to engage in these costly information-based activities, since free-riding by other market participants would largely prevent them from appropriating the benefits of screening and monitoring. Banks' mitigation of asymmetric information problems is particularly important for firms that do not have an established track record as creditworthy borrowers. In contrast, firms that have such a record can more easily access securities markets and obtain direct funding from investors (Diamond, 1991).

However, bank-based financial structures also have a dark side. Banks' provision of funding to firms and households tends to be more volatile than bond financing, with lending activity reacting more to asset price changes, both on the upside and the downside.[4] Let us consider this claim in greater detail, since it provides the conceptual underpinning for our subsequent empirical analysis.

The provision of credit by banks tends to be volatile owing to banks' high leverage, which implies a more violent operation of the financial accelerator. When asset prices rise, the increase in the value of collateral and of bank equity allows banks to expand credit, which

[4] Another drawback of bank-based finance arises from banks' superiority in acquiring information about their borrowers: their informational advantage may induce them to appropriate such a sizeable share of the profits of their borrowers as to thwart the latter's incentives to perform. This hold-up problem is analysed by Rajan (1992), who shows that it can be mitigated if a borrower also has some access to market-based funding, which provides external competition to a firm's main bank and so reduces its bargaining power vis-à-vis the firm. Unfortunately, many firms, especially small and medium enterprises (SME), have no access to bond and commercial paper markets, and therefore cannot mitigate the hold-up problem.

in turn feeds back into asset prices, prompting further credit expansion – as shown by the seminal contributions of Bernanke and Gertler (1989), Kiyotaki and Moore (1997) and Bernanke, Gertler and Gilchrist (1999). Conversely, an asset price drop forces banks to deleverage to bring their asset base in line with a lower equity base. This aggregate deleveraging process tends to induce a recessionary impulse, which exacerbates the initial asset price decline, prompting further deleveraging. The highly leveraged nature of banks thereby sets in motion a mechanism that amplifies the impact of asset price shocks both on lending and economic activity. Owing to the non-linearity of this amplification mechanism, relatively small negative shocks can lead to banking crises and persistent recessions (Brunnermeier and Sannikov, 2012; He and Krishnamurti, 2012; Boissay, Colliard and Smets, 2014).

Figure 7 shows that bank loans are indeed much more volatile and procyclical than debt security financing. Bank loans' greater procyclicality is apparent both in the upswing and the downswing of the financial cycle: they dropped by more than debt security issuance between 2009 and 2011, but expanded much more in the early 2000s. Moreover, Figure 7 shows that the two types of financing are partial substitutes: in both the subprime crisis and the euro area debt crisis, bank loans to euro-area firms dropped, while their debt security financing expanded, relative to GDP. Firms with access to debt security markets were able to buffer, at least in part, the contraction of their bank loans by issuing more debt securities. A similar picture emerges from US flow of funds data, where the loan series is strongly pro-cyclical, while bond financing is more stable and less affected by recessions, and even rose over the recent financial crisis.[5]

***Insert Figure 7 here***

This strong pro-cyclicality of bank loans, compared with market-based financing, implies that a country's "bank bias" affects both the level of systemic risk and economic growth, as explained in the following two sections.

## 2.1. Systemic Risk in Bank-Biased Financial Structures

When asset prices rise, banks' rapid credit expansion occurs at the expense of credit quality. As aggregate credit creation increases, banks are increasingly likely to finance risky and unprofitable borrowers, as the pool of creditworthy customers becomes increasingly thin. Banks' systematic financing of loss-making projects is only revealed once asset prices revert and the mispricing of credit risk by banks is corrected.

Why do banks willingly expand credit volume at the expense of credit quality when asset prices rise? Asset price booms generally occur against the backdrop of abundant funding liquidity and low interest rates, which encourage banks to lower their credit standards. A

[5] Becker and Ivashina (2014) find evidence of substitution from bank loans to debt securities during times of tight monetary policy, tight lending standards, high levels of non-performing loans, and low bank equity prices.

rationale for this is offered by Acharya and Naqvi (2012): 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 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 under-prices credit risk. Loose monetary policy is one intervening variable which drives abundant liquidity, bank balance sheet expansion and excessive risk-taking.[6] Indeed, Maddaloni and Peydró (2011), Dell'Ariccia, Igan and Laeven (2012), Jiménez, Ongena, Peydró and Saurina (2014) and Altnubas, Gambacorta and Marques-Ibanez (2014) all find that, prior to the subprime mortgage crisis, the rapid expansion of credit and low policy interest rates softened bank lending standards.

When many banks simultaneously engage in such behaviour, their excessive risk-taking behaviour can have systemic consequences, as the values of their exposures are highly correlated. The magnitude of such risk-taking will be greater in economies more dependent on bank credit than in market-based ones. These arguments lead to our first hypothesis, which is tested in Section 3:

***Hypothesis 1: Systemic Risk in Bank-Biased Financial Structures***
*Bank-biased financial structures feature higher systemic risk, which materialises particularly during financial crises.*

## 2.2. Economic Growth in Bank-Biased Financial Structures

If bank-biased financial structures indeed feature higher systemic risk, as just hypothesised, then bank bias also carries implications for economic growth. When systemic risk is high, financial crises are more frequent and more severe. Financial crises tend to have a scarring effect, imposing long-lasting damage on economies, as Reinhart and Rogoff (2009) document. If the evidence is consistent with Hypothesis 1, then we should expect bank bias to reduce economic growth via its impact on the frequency and severity of financial crises.

Financial structure can also affect economic growth in non-crisis times. The financial accelerator mechanism implies that banks, which tend to be highly leveraged, will create excessive credit in good times (when asset prices are rising) and insufficient credit in bad times (when asset prices are falling). As argued above, this pro-cyclicality is likely to lead to

[6] Also the expectation of future, post-crisis monetary accommodation can contribute to banks' moral hazard problem, as shown by Fahri and Tirole (2012). Collectively, banks have the incentive to indulge in excessive lending if they expect to be saved by lax monetary policy in case of distress; in turn, their expectation makes monetary accommodation optimal, *ex post*. The final outcome is undesirable monetary accommodation, too much lending and excessive risk-taking.

inefficient credit allocation: in good times, banks finance a large quantity of bad projects, harming economy-wide productivity growth. In effect, these low-productivity projects undergo excessive expansion owing to an implicit subsidy arising from underpriced bank loans. This was apparent in the housing and construction boom in Spain, where investment in housing as a proportion of total investment increased from just above 60% in the late 1990s to more than 70% in 2006, driven by an expansion in bank lending. Excessive real estate lending also tends to crowd out firms' access to external funding and therefore their capacity for additional real investment (Chakraborty, Goldstein and MacKinlay, 2014), which has negative implications as enterprise credit has been found to be positively associated with economic growth, unlike household credit (Beck, Buyukkarabacak, Rioja and Valev, 2012).

Inefficiencies also arise in bad times, when the flip-side of the financial accelerator mechanism – that is, deleveraging in the wake of asset price falls – is in operation. This deleveraging process forces banks to deny credit to profitable projects. In many cases, these profitable investment opportunities cannot survive until banks return to their target leverage ratios and asset prices begin rising again. If entrepreneurs cannot obtain external funding from non-bank sources, as is likely in bank-biased financial structures, then the potential value in these transient investment opportunities will be permanently destroyed. These inefficiencies are exacerbated when banks engage in excessive forbearance of non-performing loans. By doing so, banks end up throwing "good money after bad", refinancing low-productivity projects while refusing funds to new, high-productive ones (Peek and Rosengren, 2005; Caballero, Hoshi and Kashyap, 2008). By contrast, markets are less susceptible to this time-inconsistency problem: they can more credibly commit to terminate unprofitable projects, because of the decentralised decision-making of security market investors (Dewatripont and Maskin, 1995).

In summary, banks' credit creation features inefficiencies that could be detrimental to economic growth, both in the upswing and the downswing of the financial cycle. These inefficiencies are magnified at times of crisis. These arguments lead to the second hypothesis, which is tested in Section 4.

***Hypothesis 2: Economic Growth in Bank-Biased Financial Structures***
*Bank-biased financial structures feature lower economic growth, particularly during financial crises.*

## 3. BANK BIAS AND SYSTEMIC RISK

This section tests Hypothesis 1: that bank-biased financial structures feature higher levels of systemic risk, particularly during financial crises. Banks expand their balance sheet and increase their risk-taking when asset prices rise, owing to higher values of collateral and bank equity. Given that bank-based structures tend to be more highly levered than market-based financial structures, one should observe a greater take-up of systemic risk in the former than in the latter. The risk is systemic in the sense that the risk-taking behaviour of banks during

credit expansions threatens not only their individual stability, but that of the entire financial system, owing to contagion effects arising from contractual relationships, information externalities, fire-sale externalities, and common asset exposures. The losses arising from such systemic risk-taking only materialise in the downswing of the financial cycle when asset prices plummet.

To test Hypothesis 1, we construct a dataset comprising systemic risk at the bank-level, alongside other bank balance sheet characteristics, plus information on total bank assets and stock and bond market capitalisation at the country-level. To capture banks' contribution and exposure to systemic risk, we use the variable SRISK, as calculated by New York University's Volatility Laboratory, based on work by Brownlees and Engle (2012) and Acharya, Engle and Richardson (2012). SRISK measures the euro-amount of equity capital that a bank would need to raise in the event that the broad stock market index falls by 40% over six months. A bank's SRISK is a function of its initial leverage and an estimate of its "downside beta" – that is, the sensitivity of the bank's equity value to the broad stock market index.

We divide SRISK by a bank's total assets to compute the quantity of systemic risk per unit of asset, which we label "systemic risk intensity". This normalisation is important, as it ensures that the results are not driven by the size of individual banks or a country's banking system. In addition, we replace negative observations on "systemic risk intensity" by truncating the variable at zero. Negative equity shortfalls do not contribute to systemic risk; nor do they represent a positive externality, as surplus equity cannot be redistributed among banks *ex post*.

The resulting dataset covers 517 listed banks resident in 20 different countries. The panel extends from 2000 to 2012, encompassing 4,980 bank-year observations on the "systemic risk intensity" variable. More than half of the observations on this variable take the value of zero, which implies that systemic risk is concentrated in a minority of banks. The mean is 1.4% and the observation at the 90$^{th}$ percentile is 5.1%. In our dataset, the highest observation on SRISK is Royal Bank of Scotland's €186bn in 2008; scaled by RBS's €2.5tn balance sheet, this corresponds to a "systemic risk intensity" of 7.4%.

These bank-level data are matched with country-year observations on "bank bias", our benchmark measure of financial structure. The variable is computed as total bank assets divided by the sum of stock and bond market capitalisation. These two measures of market capitalisation are obtained from the World Bank's financial development and structure dataset, described in Beck, Demirgüç-Kunt and Levine (2000). To obtain a comparably large country panel of total bank assets, we turn to country-level sources, which require careful attention to cross-country comparability. Data on bank assets were collected on a host-country basis, meaning that we count the assets of all banks resident in that country, including branches and subsidiaries of foreign banks. Our definition of banks includes all credit institutions with a banking license to receive retail deposits, including savings institutions. Other monetary financial institutions, such as money market funds, are not included.

These data are used to test the hypothesis that bank-based financial structures tend to feature greater systemic risk, particularly when financial crises materialise. We estimate

panel regressions with fixed effects, to control for time-invariant unobserved heterogeneity across countries. In all specifications, we use year dummies to control for effects which vary over time but not across countries.

The dependent variable is banks' systemic risk intensity. Since this variable is observed at bank-level, it is unlikely to have a reverse causal effect on financial structure, which is measured at the country-level. As such, we interpret the estimated coefficient of "bank bias" as the conditional effect of that variable on banks' systemic risk intensity.

In the first specification (shown in Table 1, column I), greater bank bias at the country-level is associated with greater systemic risk intensity at the bank-level. The relevant coefficient is statistically significantly at the 1% level.

In column II of Table 1, we control for three time-varying bank characteristics: bank size, size relative to GDP, and leverage. The conceptual rationale for the inclusion of these three variables is as follows. First, large banks tend to be more interconnected with other banks, which increases their importance within financial networks, particularly in derivatives markets, which feature high scale economies (Langfield, Liu and Ota, 2014). Large banks also tend to have less stable funding structures, more market-based activities, and more complex organisational structures. These features lead large banks to create more systemic risk (Laeven, Ratnovski and Tong, 2014). Second, a measure of size as a proportion to GDP captures the relative importance of that bank to the real economy, both in terms of a large share of deposits and in the ongoing provision of loans to the real economy. Size is one of the key indicators used by the Basel Committee to identify systemically important banks (BCBS, 2013). Such banks are more likely to receive public-sector support, in the form of extraordinary liquidity assistance and creditor bail-out in the event of distress, owing to their importance to the financial system and real economy. The moral hazard arising from this implicit subsidy leads large banks to take additional risk (Afonso, Santos and Traina, 2014). Third, highly leveraged banks are likely to have a higher systemic risk intensity, owing not only to the role of leverage in the construction of the SRISK variable, but also to the effect of low franchise value on shareholders' incentives to "gamble for resurrection" by requiring bank managers to take excessive risks (Admati and Hellwig, 2013).

All three control variables in column II of Table 1 have the expected positive sign and are significant at the 1% level, but do not subtract from the statistical significance of the estimated coefficient of the bank bias variable, which decreases only slightly, from 0.0130 to 0.0095.

The specification in column III of Table 1 also controls for asset price movements: the yearly real stock market return and yearly real house price growth. When asset price growth is high, systemic risk intensity is likely to fall owing to the increase in the value of banks' asset holdings, which moves banks away from their default points. Failing to control for asset price movements could bias the estimates, since asset price changes are negatively correlated not only with banks' systemic risk intensity, but also with the "bank bias" variable. Stock and bond market capitalisation are at market prices, and therefore respond immediately to changes in asset prices, whereas the book value of banks' assets responds slowly. A surprise increase in asset prices would therefore lead to a temporary decrease in "bank bias", with a

convergence to the initial value over time as book values gradually adjust. Thus, the omission of asset price variables in columns I and II of Table 1 could underpin at least some of the positive coefficients of the "bank bias" variable estimated in those regressions. In the full specification in column III, we indeed observe a reduction in the estimated coefficient of the "bank bias" variable. However, the estimated coefficient remains significant at the 1% level of confidence. Consistent with Hypothesis 1, "bank bias" has a positive and significant effect on banks' systemic risk intensity, after controlling for time-varying bank characteristics, asset price movements, and year and bank fixed effects.

***Insert Table 1 here***

Hypothesis 1 also postulates that systemic risk intensity is likely to be particularly high in bank-biased financial structures when asset prices fall, owing to the financial accelerator. To test this hypothesis, we compute two dummy variables capturing different types of financial crisis. The first dummy variable – "housing market crisis" – is equal to 1 when a country's real house prices drop by at least 10%, and 0 otherwise. The second – "stock market crisis" – is equal to 1 when a country's real stock prices drop by at least 20%, and 0 otherwise. It is important to capture different types of financial crisis, as the financial accelerator can operate through the prices of different asset classes. Moreover, different financial crises often occur at different times. This is underscored by Figure 8, which plots the frequency of the two types of crisis between 1990 and 2011. For example, in 2008 more than half of the 70 countries in our dataset experienced a stock market crisis and nine a housing market crisis. Three years later, there were just five stock market crises.

***Insert Figure 8 here***

To test the strength of the effect of bank bias on systemic risk intensity during financial crises, we interact the two crisis dummies with the bank bias variable. In Table 2, we add these interacted variables to the specification from Table 1, column II. In the two new specifications, the estimated coefficient of the "bank bias" variable remains positive and significant, as in Table 1. In addition, the estimated coefficient of the crisis dummy is positive and significant in both specifications: as expected, we find that banks' systemic risk intensity tends to be higher during financial crises. Moreover, the estimated coefficients of the three control variables – bank size, bank size relative to GDP, and leverage – continue to have the expected sign.

Furthermore, in column I of Table 2 we find that systemic risk intensity in bank-biased countries is particularly elevated during housing market crises. This finding should be viewed through the lens of the increasing importance of mortgage lending on banks' balance sheets, as documented by Jordà, Schularick and Taylor (2014). As a result, the financial accelerator operates in particular through the price of housing and related assets (such as mortgage loans). By contrast, the coefficient of the interaction term is insignificant in column II, in which the crisis dummy is defined as a stock market crash of more than 20% in one year.

***Insert Table 2 here***

To recap the results of Table 2, we find that a bank-biased financial structure tends to increase banks' systemic risk intensity – conditional on time-varying bank characteristics and year and bank fixed effects – and that this effect is particularly acute during housing market crises. The economic magnitude of this finding is visualised in Figure 9, which plots the predicted effect of countries' bank bias on banks' systemic risk intensity over the distribution of the "bank bias" variable. The right-hand-side of each graph corresponds to the most bank-biased financial structure in our country-year panel dataset. In both graphs, the lines are upward sloping: predicted systemic risk intensity increases as bank bias increases, both during and outside of financial crises. Moreover, the slope of the predicted effect conditional on a crisis is higher during housing market crises, reflecting the positive and significant coefficients of the interaction term which were estimated in column I of Table 2.

***Insert Figure 9 here***

To garner further insight on the economic magnitude of the predicted effect, consider a hypothetical large bank with total liabilities of €1tn. Fixing the size of the bank permits us to convert the "systemic risk intensity" variable into a euro-amount of systemic risk. Fixing bank size also changes the predicted effect, as the regressions in Table 2 include estimated coefficients of bank size and bank size relative to GDP, both of which are positively associated with systemic risk intensity. By way of illustration, Figure 10 shows the predicted systemic risk contribution of a €1tn bank according to the "bank bias" of five major countries in 2011: the United States, Japan, France, the United Kingdom and Germany.

The differential effect across these five countries is sizable. During a housing market crisis, the model predicts that a €1tn bank in Germany, which had a "bank bias" of 5.7 in 2011, will contribute €78bn to systemic risk. By contrast, a €1tn bank in the US, which had a "bank bias" of 0.4 in 2011, will contribute €47bn to systemic risk during a housing market crisis – a differential of €31bn. Absent a housing market crisis, the predicted differential in systemic risk between Germany and the US drops to €16bn.

***Insert Figure 10 here***

## 4. BANK BIAS AND ECONOMIC GROWTH

We now turn to Hypothesis 2: that bank-biased financial structures feature lower economic growth, particularly during financial crises. In Section 3, we found evidence that bank-biased financial structures feature higher systemic risk. Owing to the permanent damage that financial crises typically wreak on economic output, we expect that the higher level of systemic risk observed in bank-biased structures would also lead to lower economic growth.

In addition, the financial accelerator mechanism implies that banks will create excessive credit in good times and insufficient credit in bad times, leading to an economy-wide misallocation of real resources, and thus to lower long-run growth.

To test Hypothesis 2, we complement the dataset described in Section 3 with macroeconomic data (while dropping bank-level observations on systemic risk intensity). The resulting dataset contains 748 observations for 45 countries between 1988 and 2011. The binding constraint on the size of the dataset is the bond market capitalisation variable, the observations on which begin only in the late 1980s in the World Bank's financial development and structure dataset, and which is available for fewer countries than the stock market capitalisation variable.

The new dependent variable is the yearly growth in real GDP per capita. The independent variable of interest is the "bank bias" variable, which is the natural logarithm of the ratio of total bank assets to stock and bond market capitalisation, lagged by one year. As in Tables 1 and 2, we estimate panel regressions with fixed effects and year dummies, to control both for unobserved time-invariant heterogeneity across countries, and for common time-varying effects. In column III, we see that the "bank bias" variable is negatively correlated with GDP growth, so that an increase in the size of the banking sector relative to stock and bond market capitalisation is associated with lower GDP growth one year later, conditional on the country and year fixed effects. This result contrasts with Levine (2002), who finds no relationship between financial structure and economic growth in World Bank data spanning 1980-1995. Pagano *et al* (2014) re-estimate the regression specifications in Levine (2002) using updated data, and find that bank-biased financial structures are conditionally associated with lower economic growth, consistent with our findings in Table 3. This time-varying relationship between financial structure and economic growth can be interpreted in light of the basic facts presented in Section 1: Europe's banking system only started to become extraordinarily large from the mid-1990s.

Columns II and III of Table 3 introduce crisis dummies, also interacted with the "bank bias" variable. The introduction of crisis dummies permits us to test the hypothesis that economic growth in countries with a bank-biased financial structure is more severely affected by financial crises than growth in countries with a more balanced financial structure. We classify crises in two types, as in Table 2: a "housing market crisis" (defined as a real house price drop of at least 10%), and a "stock market crisis" (defined as a real stock price drop of at least 20%).

The resulting estimates indicate that economic growth tends to be particularly low in bank-biased countries during housing market crises. By contrast, the coefficient of the interaction between the stock market crisis dummy and the "bank bias" variable is instead not significantly different from zero, as in Table 2. This finding reflects the important role played by house prices in determining the value of the collateral attached to bank loans. Consequently, when house prices drop, banks are constrained in their ability to provide new funding to profitable projects. The evidence presented in column II of Table 3 is consistent with the idea that the contraction in credit (induced by the financial accelerator) destroys the

potential value in transient profitable investment opportunities which fail to receive external funding in bank-biased economies.

***Insert Table 3 here***

Figure 11 plots the predicted economic magnitude, based on the estimates shown in Table 3. The two graphs plot the modelled relationship between countries' bank bias and GDP growth over the distribution of the "bank bias" variable. Three insights stand out. First, the lines are downward sloping in both graphs, indicating a negative association between an increase in "bank bias" and predicted GDP growth one year later. Second, the dark grey line, which shows predicted GDP growth conditional on a financial crisis, always lies below the light grey line, which shows predicted GDP growth in non-crisis periods. This reveals the additional negative impact that crises have on GDP growth. Third, the slope of the dark grey line is particularly large conditional on a housing market crisis, which reflects the strongly negative coefficient of the respective interaction term estimated in column I of Table 3.

***Insert Figure 11 here***

To estimate the economic magnitude for major European countries, Figure 12 provides specific predictions based on the level of "bank bias" in France, the UK, Italy and Germany in 2011, compared with that of the US and Japan. The predicted effects shown in Figure 12 are based on the estimated coefficients in column I of Table 3, where the crisis dummy is defined as a yearly drop in real house prices of at least 20%. We choose this specification because, during housing market crises, "bank bias" has a particularly strong and significant effect on economic growth, according to the estimates shown in Table 3. Figure 12 provides some specific point estimates of predicted real GDP growth over the distribution of the "bank bias" variable and conditional on a housing market crisis. For example, a housing market crisis in the US, given the US's financial structure in 2011, is associated with real GDP growth 3% points lower than the average, whereas the predicted impact in Germany is 5.7% points, owing to Germany's greater bank bias.

***Insert Figure 12 here***

The regressions estimated in Table 3 are potentially subject to endogeneity concerns. Unlike the regressions estimated in Tables 1 and 2, where the dependent variable is observed at bank-level and the key independent variable ("bank bias") at country-level, Table 3 models the conditional relationship between two country-level variables: GDP growth and "bank bias". GDP growth could plausibly exert a reverse causal effect on the "bank bias" variable, which would compromise a causal interpretation of the regression results shown in Table 3. In particular, a surprise increase in GDP growth would be expected to increase stock and bond market capitalisation immediately, given that capitalisation is measured at market prices. Bank total assets, however, would respond with a lag, as book values are slow to adjust.

Therefore, the negative conditional relationship between GDP growth and bank bias that we estimate in Table 3 could at least in part reflect the negative causal impact of GDP growth on bank bias.

As a first step to address these endogeneity concerns, we re-estimate column I of Table 3 using long lags of the potentially endogenous "bank bias" variable. In particular, Table 4 re-estimates column I of Table 3 for four different lag structures: 3-year, 5-year, 10-year and 15-year moving averages. Using such long lags diminishes endogeneity concerns, given that banks' book values should have sufficient time to adjust to any changes in fundamental values. The estimated coefficients of the lagged "bank bias" variable remain stable as the moving average window increases over columns I, II, III and IV in Table 4. The coefficient of the "bank bias" variable estimated in column IV of Table 4, which uses a 15-year moving average window, is indistinguishable from the comparable coefficient estimated in column I of Table 3.

***Insert Table 4 here***

Next, we try an additional control for the potential endogeneity of the "bank bias" variable to GDP growth by estimating instrumental variable (IV) regressions. The first set of such regressions uses six measures of financial reforms as instruments, provided by Abiad, Detragiache and Tressel (2008): a measure of the strength and intrusiveness of banking sector supervision; a measure of security market liberalisation; a measure of ceilings on bank credit; a measure of interest rate liberalisation; a measure of privatisation of banks; and a measure of barriers to entry to the banking sector. The choice of these instruments is motivated by the idea that a change in the legal and regulatory environment will affect financial structure in equilibrium. For example, an increase in our first instrument – the strength of banking sector supervision – should increase the relative attractiveness of non-bank intermediation. In terms of validity, these instruments are themselves potentially subject to endogeneity insofar as financial sector liberalisation is more likely to occur in fast-growing economies. To address this concern, we lag the observations on the financial sector reform instruments by six years. After a period of six years, the effect of financial sector liberalisation on GDP growth is likely to have petered out, leaving in the data only the effect on the level of GDP.

In the first-stage regressions, the coefficients of the six measures of financial reform are statistically significant, with F-tests rejecting the null hypothesis at the 1% confidence level. We therefore infer that the instruments are relevant, in the sense that they are conditionally correlated with the "bank bias" variable. In particular, in column I, the estimated coefficients on measures of the strength and intrusiveness of banking sector supervision, security market liberalisation and barriers to entry to the banking sector are individually significant. As expected, the first two such instruments are negatively associated with "bank bias", since they both increase the relative attractiveness of market-based finance; while the third instrument, barriers to entry to the banking sector, is positively associated with "bank bias", as this liberalisation expands the expansion capacity of the banking sector.

Table 5 reports the results of the second-stage IV regression. Overall, the results are consistent with those in Tables 3 and 4, in the sense that an increase in the "bank bias" variable is associated with lower economic growth. This is true of all specifications reported in Table 5. However, the source of the effect appears to vary. In column II, the coefficient of the interaction between the housing market crisis dummy and the "bank bias" variable is significantly negative. This suggests that the downside of the financial accelerator mechanism – that is, a contraction in lending and growth owing to banks' deleveraging – is potent when house prices fall sharply. This finding emphasises the importance of housing and related assets on banks' balance sheets. By contrast, the coefficient of the interaction term in column III (in which the crisis dummy is defined as a stock market crisis) is insignificant; the predicted negative impact of "bank bias" derives solely from the estimated coefficient of the "bank bias" variable itself.

***Insert Table 5 here***

Our second set of IV regressions relies on measures of real economy structure as instruments. Over time, the financial structure is likely to adjust to reflect the structure of the real economy, since certain firms and sectors tend to be better served by banks or markets. In general, banks are likely to be efficient originators and servicers of credit when the costs of acquiring information are particularly high, owing to their specialisation in collecting information as relationship lenders. By contrast, market-based financing has a comparative advantage when information costs are low and borrower characteristics are relatively standardised. Moreover, markets are likely to be better financiers of innovation if 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.

In light of these theoretical arguments regarding the relative merits of bank-based and market-based financing for different real economy structures, we compute two new instruments. The first is the value-added of the manufacturing sector (composed of ISIC divisions between 15 and 37) as a percentage of GDP, obtained from the World Bank. The second instrument is total spending on research and development (R&D) in the manufacturing sector as a proportion of total manufacturing sector output. To calculate this "R&D intensity in manufacturing" variable, we use the UNIDO INDSTAT2 2014 database, which contains annual data on output for 23 manufacturing industries in 152 countries between 1970 and 2011. For each country-year, we calculate the share of each industry's output in total manufacturing output. We then match this information to industry-level panel data on R&D

spending, using the OECD's STAN database. To overcome limitations on data availability, we define R&D intensity per industry by averaging observations from the United States between 1995 and 2008. Following Rajan and Zingales (1998), we treat the US as the global technological frontier, on the assumption that the R&D intensity of each industry in the US measures that industry's actual R&D intensity given the current state of technology. The final step in constructing this "R&D intensity in manufacturing" variable is to multiply output by R&D intensity for each industry-country-year. We then sum the observations within each country-year to compute total spending on R&D in the manufacturing sector as a proportion of total manufacturing sector output.

In the first-stage regressions these two instruments – manufacturing output and R&D intensity in manufacturing – have statistically significant coefficients. The estimated coefficients of both instrumental variables are negative, suggesting that both higher manufacturing output and higher R&D intensity are associated with less bank bias. The latter finding in particular is consistent with the observation that innovation tends to occur in economies with market-based financial structures (Allen, 1993).

The second-stage IV regressions are reported in Table 6. Qualitatively, the results are similar to those shown in Table 5. Again, the coefficient of the interaction between the crisis dummy and the "bank bias" variable is significantly negative in column II, in which a financial crisis is defined as a housing market crisis. In column III, in which a financial crisis is defined as a stock market crisis, the predicted negative impact of "bank bias" derives solely from the estimated coefficient of the "bank bias" variable itself; the interaction term is insignificant.

***Insert Table 6 here***

On the whole, the results in Tables 3, 4, 5 and 6 yield two key common insights. First, bank bias exerts a negative effect on economic growth in all specifications. Second, housing market crises exert a strongly negative effect on economic growth in countries with bank-biased financial structures, probably owing to the importance of assets related to housing on banks' balance sheets. Both of these insights are consistent with our second hypothesis.

## 5. WHY DID EUROPE DEVELOP A BANK BIAS?

Bank-biased financial structures have sizeable implications for financial stability and macroeconomic performance, as Sections 3 and 4 show. It is therefore important to consider why banks became so dominant in Europe's financial structure in particular, as Section 1 documents. To understand the factors underlying Europe's trend towards bank bias, it is worth noticing that its financial system has been increasingly dominated by its largest banks, not just by banks in general. To show this, we perform the following thought experiment. Suppose that the assets of the largest 20 European banks had grown in line with nominal GDP since 1996: then, what would have been the total size of Europe's banking system in 2012? The

grey dashed line in Figure 13 plots this resulting "counterfactual ratio" between bank assets and GDP, while the black solid line plots the corresponding actual values. Strikingly, 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.

***Insert Figure 13 here***

Explaining why Europe has developed an increasing bank bias amounts largely to asking which factors account for the growth of Europe's largest banks. In this section, we consider two such factors: first, public bank support and prudential supervision; and second, political support for banks. We argue that these two factors have been particularly supportive of the expansion of large banks in Europe.

### 5.1. Public Support and Prudential Supervision

In most countries, banking is one of the most regulated and closely supervised industries. The intensity of bank regulation and supervision arises from the peculiar severity of moral hazard problems in banking: banks borrow from a large pool of unsophisticated and dispersed depositors, creating risk-shifting incentives for banks' shareholders and managers. These moral hazard problems, coupled with banks' intrinsic fragility stemming from their maturity transformation function, explain why public policy typically protects depositors via insurance schemes and subjects banks to prudential regulation and supervision to curb their risk-shifting incentives and create equity buffers to absorb losses in case of distress.

However, intensive bank regulation and supervision might be inadequate, and engender unintended consequences. Deposit insurance schemes generate moral hazard, as they shift insolvency risk onto taxpayers. Capital requirements are often softened by banks, especially the largest ones, by exploiting loopholes in prudential regulation. Banks that are so large and interconnected with others that their collapse would threaten systemic stability can expect to be bailed out by the government in case of distress: they are "too big to fail" (TBTF). This implicit creditor bailout guarantee is a further source of moral hazard, beyond that implied by public deposit guarantees.

In turn, the public support granted to TBTF institutions may prompt bank managers to pursue size as an objective *per se*, in order to become systemically important and obtain the public subsidies afforded to systemically important banks. They can do so in a variety of ways: by expanding lending in areas where it is quickly and easily scalable, such as loans secured against housing (Manove, Padilla and Pagano, 2001); by acquiring other banks or merging with them; or by proprietary investment in securities. In all of these activities, bank managers will place relatively little weight on risk management, since the main objective is to expand the size of their balance sheet.

These factors, however, are not specific to Europe: while they may have driven growth in banks worldwide, they cannot explain why Europe's banking system expanded

more, or why Europe's largest banks have grown so large. What is special about Europe that triggered these phenomena?

One possible explanation is that European governments have been particularly supportive of banks, especially large ones, both in the form of bailout guarantees and regulatory forbearance. Lambert and Ueda *et al* (2014) find that the magnitude of this implicit government subsidy of banks has declined somewhat from crisis peaks, but that it remains substantial, especially in the euro area. 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 not only the generally weaker state of euro area banks' balance sheets, but also differences in policy frameworks, such as that of bank resolution.

National supervisors in the EU 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 14, 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 bank failure rate during a systemic banking crisis suggests a greater degree of regulatory forbearance by supervisors towards undercapitalised banks.

***Insert Figure 14 here***

Rather than resolving distressed banks, European authorities have often preferred to rescue them by favouring acquisitions by (or mergers with) other banks. Over the financial crisis, there are many examples of national governments and supervisors facilitating distressed mergers or acquisitions, despite concerns regarding excessive concentration and lack of competition.[7] 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).

This "lack of exit" induced by public support for distressed and unprofitable banks helps to explain simultaneously both the increase in Europe's bank bias, and its coincidence with the growth of the largest banks. This policy has contributed to the increase in bank concentration, and at least partly explains the low frequency of bank failures in Europe. Moreover, by worsening banks' moral hazard problems, this strong government support is

[7] 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 the 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.

likely to correlate with greater risk-taking.[8] Thus, public support also helps to explain why greater bank bias is associated with greater systemic risk, as documented in Section 3.

What explains the greater public support given to distressed banks in the EU, as compared with the US? One can think of several reasons, aside from politics (the role of which will be discussed in the next section).

First, banking supervision in parts of Europe has historically been less effective than in the US. Until 2014, when a single supervisor was created in the euro-area, 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, supervisors' power was impaired by a weak, even non-existent, bank resolution framework throughout the EU.

Second, in Europe the universal banking business model is pervasive, as shown by Pagano *et al* (2014). 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: in short, they are large universal banks, with a strong presence in securities markets.

A third specificity of Europe is that, in the euro area, the expansion of banking rode on the back of the process of financial integration that accompanied and followed monetary unification. Lane (2013) and Lane and McQuade (2014) document 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 central and eastern Europe.

### 5.2. Political Factors

Throughout history, banking and politics have been closely connected (Calomiris and Haber, 2014). Political factors have played a particularly important role in the recent growth of European banks, especially the largest ones, in a variety of ways. One factor, already analysed above, is the public support given to distressed institutions, and its interaction with regulatory forbearance by prudential authorities. But public support to banks by politicians may extend far beyond the case of distressed banks.

First and foremost, European governments have nurtured the birth and growth of mega-banks that act as "national champions" in competition with foreign banks – an attitude that Véron (2013) labels "banking nationalism". This policy ranges from preferential

[8] 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.

treatment by governments to the protection against foreign competition and against takeover bids by foreign banks. The connection between banks and politics may also be self-reinforcing. Banks have been able to strengthen their dominance within Europe's financial structure over time by lobbying for favourable legislation; and, as they have become more vital to the functioning of financial markets and to the economy, they have increased their lobbying power vis-à-vis politicians.

Second, in some EU countries politicians have a direct interest in supporting some banks and ensuring their survival, because banks are either publicly owned or their management is politically appointed, either directly or indirectly. In Germany, public sector banks account for 46% of all bank assets (Hau and Thum, 2009), and are mainly of two types: the savings banks (*Sparkassen*), which have local or regional scope, and are owned by their respective municipalities or counties; and the regional banks (*Landesbanken*), which are major universal banks with nationwide and international operations. In Italy, political influence on banks is more indirect, but it is also pervasive: politicians, especially local ones, affect the governance of "banking foundations" (*fondazioni bancarie*), which in turn have important stakes in the share ownership structure of many banks, including the largest. The banks in which foundations have major equity stakes comprise 23% of total Italian banking assets, and the foundations' stakes typically amount to 20% or more of bank capital, although in several large banks they control boards with a smaller share of ownership, often via agreements with other shareholders (Jassaud, 2014). In Spain, the management of savings banks (*cajas*) is closely connected with local politicians, a connection that according to Garicano (2012) was a factor in the slow and ineffective response of Spanish prudential supervisors to the crisis, and the protracted forbearance of bad loans to real estate developers.

## 6. POLICY SOLUTIONS TO EUROPE'S BANK BIAS

Before turning to policy, let us recap the main findings of the paper. Section 1 documented that banking in Europe has expanded at an extraordinary pace, far more than in the US and Japan, especially since 1995. As a result, Europe's financial structure has become bank-biased, in the sense that the size of banks dwarfs that of the stock and bond markets. Section 2 discussed theories that suggest that bank bias can raise systemic risk, especially at times of severe and broad asset declines; and that bank bias can lower economic growth, particularly during financial crises. Section 3 and 4 produced evidence that is largely consistent with these two predictions: based on our estimates, Europe's bank-biased financial structure is associated with greater systemic risk and worse growth performance than would exist if its structure were more balanced. In Section 5, we argued that Europe's peculiarly bank-biased financial structure can be traced to particularly generous public support for banks, both through implicit bailout guarantees and supervisory forbearance, coupled with a political attitude which favours "national champions" and publicly owned banks.

Reducing Europe's bank bias should therefore be an important intermediate objective of financial policy. To some extent, Europe's financial structure is already in the

early stages of a re-balancing away from banks and towards market-based intermediation. Since 2011, European banks have downsized, creating slack in the supply of external funding which security markets have partly taken up (ECB, 2014). Primary corporate bond issuance has increased, alongside the total size of non-bank financial institutions which are associated with the development of securities markets, such as institutional investors. This re-balancing is somewhat cyclical: as Figure 7 shows using aggregate data, and as Becker and Ivashina (2014) document using firm-level data, bank loans and debt securities are partial substitutes. But the shift towards market-based finance is also likely to prove structural – an expectation which European policymakers share (Constâncio, 2014; Liikanen, 2014).

In Section 5, we argued that Europe's bank-biased financial structure arose largely due to past policies and political attitudes. As such, a substantial and long-lasting re-balancing of Europe's financial structure can only be achieved with appropriate reforms and changes in political attitudes, in particular on two fronts. First, policymakers should reduce regulatory favouritism towards banks. Many recent policy innovations go in this direction, as Section 6.1 documents – but more progress is needed, in particular in terms of structural reform targeted at large universal banks and a more stringent anti-trust policy. Second, policymakers should support the development of securities markets as an alternative source of external funding. Here, policy reform is in its early stages: the EU Commission has announced its intention to deliver a "capital markets union" in Europe, but its contents are still being debated (Hill, 2014; Juncker, 2014). Section 6.2 outlines how this capital markets union should be designed in a way which lowers Europe's bank bias, thereby reducing systemic risk and supporting economic growth.

### 6.1. Reducing Regulatory Favouritism Towards Banks

Recent reforms adopted by the EU establish a stricter regulatory regime for banks, by requiring banks to fund themselves with more and higher quality capital, tightening prudential supervision and improving the process of resolution of insolvent banks. Four policy innovations are particularly noteworthy:

- 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, with the intention to "prevent and mitigate long term non-cyclical systemic or macroprudential risks" (Article 133 of the CRD) – such as the elevated systemic risk associated with bank-biased financial structures documented 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 should help to combat the "banking nationalism" which hitherto fostered national banking champions and contributed to the EU's bank bias.

- In July 2014, the bank recovery and resolution directive (BRRD) entered into force. The BRRD will enable (from 2016) authorities to "bail-in" the eligible liabilities (including unsecured creditors) of banks subject to resolution. 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 August 2014, a regulation establishing a Single Resolution Mechanism (SRM) entered into force. The SRM establishes a resolution authority in the euro-area, 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. However, the resolution mechanism is extremely complex, and the resolution fund will not reach its target level (of 1% of insured bank deposits: about €55bn) until 2023.

These four policy innovations – CRD, SSM, BRRD and SRM – are necessary steps towards a healthy banking system in the EU. Higher bank capital requirements under the CRD will reduce the probability of bank failure, while resolution powers stemming from the BRRD ensure that resolution 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.

Though necessary, these reforms are unlikely to be sufficient to substantially reduce Europe's extreme bank bias. In particular, the effectiveness of the Single Resolution Mechanism faces three challenges. First, the SRM entrusts the decision to resolve a bank to many authorities: the ECB (as prudential supervisor), the Board of the SRM (which comprises five full-time members and representatives from national resolution authorities), the EU Commission and the EU Council, while it leaves implementation to national authorities. Second, the Single Resolution Fund might have limited capacity to support the resolution of a systemically important financial institution (Gordon and Ringe, 2014). Third, the EU resolution mechanism is not complemented by a centralised deposit insurance mechanism, unlike the FDIC in the US: hence, bank runs could occur in countries where banks are perceived as distressed, as depositors try to move their deposits to banks in countries with more trustworthy legal arrangements. This type of behavior could interfere with the orderly resolution of a distressed bank. These three challenges – the complexity of the resolution mechanism; the potentially insufficient scale of its funding; and the absence of a centralised

deposit insurance mechanism – could therefore hinder the prompt and orderly resolution of large, systemically important banks in the EU.

A more direct and potentially effective correction of Europe's bank bias may come from "structural reform" of the EU banking system. The EU Commission has put forward a proposal (published in January 2014) for legislation that aims to separate the lending activity of banks from their security trading activity, with the aim of limiting their risk exposure and controlling systemic risk. The separation would apply only to banks of global systemic importance or beyond a certain size. The proposal would also ban banks' proprietary trading, in the narrow sense of trading specifically dedicated to taking positions for making a profit for the bank's own account. This proposal would help to reduce both the size of the largest banks and their risk-taking in securities markets. Separation would effectively eliminate the ability of large universal banks to fund their trading activities at interest rates that reflect the public subsidies associated with their deposit-taking activities – a cross-subsidy that raises these banks' incentive to take risk in securities markets. Hence, structural reform targeted at the largest banks would at the same time reduce Europe's bank bias by shrinking the large banks' security trading activity, and mitigate the systemic risk that these banks tend to generate, as shown by our estimates in Section 3.

To complement structural reform targeted at the largest and most systemically relevant banks, the EU could also implement a more aggressive anti-trust policy. This would help to address Europe's bank-bias problem, which arose owing to the growth of its largest banks. Aggressive anti-trust policy 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 Single Supervisory Mechanism (SSM), which already creates greater distance between the supervisor and the largest banks, as compared with the *status quo ante*. Historically, 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, UK competition authorities, the Commission cannot address market structure issues, intervening whenever it detects excessive market power. Moreover, unlike the US, the EU has no hard ceiling on the maximum size of a single bank.[9] Hence, a more aggressive anti-trust policy is only possible if the powers of the EU Commission in this area are considerably strengthened.

### 6.2. Supporting the Development of Securities Markets

Reducing Europe's bank bias need not reduce European firms and households' access to external funding if policymakers simultaneously encourage the development of security markets (including the stock market, the corporate bond market, and markets for asset-backed securities) and other non-bank funding sources. Indeed, the results presented in Section 4

[9] 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 deposit growth. Indeed, three (nearly four) US banks currently exceed the 10% threshold.

suggest that a more balanced financial structure would boost economic growth by improving access to external funding, particularly during financial crises when banks tend to retrench.

Supporting the development of securities markets is a key objective of the Juncker Commission, which began its five-year term in November 2014. To this end, the Commission has pledged to deliver a "capital markets union" (Hill, 2014), complementing the newly established "banking union", which comprises the Single Supervisory Mechanism and Single Resolution Mechanism described in Section 6.1. The capital markets union is explicitly intended to "reduce the very high dependence on bank funding" which prevails in Europe (Juncker, 2014). The evidence presented in Sections 3 and 4 provides strong support for this goal of reducing Europe's bank bias.

How should policymakers design the capital markets union to achieve maximum effect? Unlike the banking union, which is comprised of two key pillars (the SSM and SRM), the capital markets union requires a multiplicity of policy reforms in order to provide sufficient impetus to the development of securities markets. In what follows, we highlight some key reforms that can be expected to support the development of the stock market, the corporate bond market, and markets for asset-backed securities.

To develop the issuance of equity, policymakers could address the current fragmentation of stock exchanges in Europe. Unlike the US, which is served by the NYSE and NASDAQ, there is no stock exchange which serves the whole of Europe. Euronext – covering the Netherlands, France, Belgium and Portugal – is the only large multinational exchange. Consolidation of Europe's stock exchanges should help to improve market liquidity and therefore the aggregate size of the public equity market. Fragmentation inhibits market liquidity through three channels (Foucault, Pagano and Roell, 2013): first, fragmentation confers an advantage to informed investors, who have access to multiple exchanges, and therefore increases these investors' informational rents; second, fragmentation implies that several prices are quoted simultaneously, increasing search costs; and third, fragmentation prevents investors from taking full advantage of the "thick market externalities" arising from the fact that each additional market participants increases liquidity for all other traders (Pagano, 1989). However, consolidation of Europe's stock exchanges could raise concerns regarding a lack of competition (Foucault and Menkveld, 2008): in the extreme, monopoly rents could erode the efficiency gains from consolidation. To avoid harmful monopolistic behaviour, stock exchanges could be subject to enhanced regulation following consolidation. Moreover, the growth of trading venues other than stock exchanges, such as multilateral trading facilities, should mitigate concerns regarding the possibility of monopoly power.

Policymakers' attention should be directed in particular to small and medium sized enterprises' (SMEs') access to initial public offerings (IPOs). Currently, stock exchanges are generally not well geared towards SMEs, since fixed costs associated with IPOs and subsequent listing requirements are relatively high. Some specialised exchanges attempt to limit fixed costs by limiting pre-IPO filing requirements, but equity issuance via such

exchanges is still relatively limited.[10] To further reduce the fixed costs of IPOs for smaller firms, policymakers could explore whether to relax disclosure and audit requirements on certain listed firms.[11] Moreover, the deep-seated cultural reluctance of many small European firms to go public could justify initial subsidies or preferential treatment in order to provide impetus for the development of specialised stock exchanges. This would also encourage the development of the financial "ecosystem" that complements stock exchanges, which has deteriorated in Europe in the past decade (Giovannini and Moran, 2013) – namely venture capital firms for potential future issuers; advisory services for issuers; auditors for listed firms; and third-party assessors/analysts, brokers and market-makers for investors.

The issuance of corporate bonds could be increased by encouraging the standardisation of issuance, including of characteristics such as coupons and maturities. This would permit existing issues to be reopened, rather than creating new bespoke securities – thus reducing the number of distinct bonds. If such reopening were to occur via auctions, issuers would also save underwriting fees, thereby reducing the "barrier to entry" which prevents many medium-sized firms in Europe from raising external funding via bond issuance. Moreover, the standardisation of maturity dates and their alignment with bond futures and credit derivatives would facilitate hedging (CGFS, 2014). The liquidity of corporate bond markets may be further enhanced by transforming them from over-the-counter (OTC) markets, which are typically decentralised, opaque and illiquid, to electronic limit-order-book (LOB) markets, which are centralised, more transparent, and offer cheaper trade execution. Standardisation would also be helpful to promote the marketing of bond issuances to final investors. To improve transparency and comparability of credit risk across firms, a common template for prospectuses could be used, as in the US (Dixon, 2014).

Markets for asset-backed securities represent another potential source of non-bank funding. The credit underlying asset-backed securities is typically originated by banks, but the structured and somewhat standardised nature of these securities permits tranches to be sold, typically over-the-counter, to non-bank investors. Asset-backed securities therefore expand the potential universe of funding available to firms and households, while retaining banks' comparative advantage in relationship lending. Securitisation has gained a bad reputation from securities based on US sub-prime mortgages, which collapsed in value over 2007 and 2008 as risks were systematically underestimated (Keys, Mukherjee, Seru and Vig, 2010). European ABS markets have not revitalised since 2008 (Altomonte and Bussoli, 2014; Nassr and Wehinger, 2014) – even though structured credit in Europe had much lower default rates than in the US over the crisis, according to the ECB and Bank of England (2014). Securitisation activity may have been subdued in part by the calibration of current regulations – particularly the CRD IV package and Solvency II – which penalise holdings of structured credit relative to other assets with similar risk characteristics. In principle, risk-based capital requirements should be calibrated according to the underlying risk, rather than the type of

[10] In Germany, the Neuer Markt – an attempt by Deutsche Börse to facilitate IPOs for SMEs with high growth potential –closed in 2003. Its more successful British cousin – LSE's AIM – has 1,099 listed firms with a total market cap of £72bn (as of November 2014), but just 12 of these firms (with total market cap of less than £1bn) are incorporated in continental Europe (i.e. outside of Britain and Ireland) – so this is a negligible source of external finance for continental European SMEs.

[11] For example, disclosure and audit requirements could be relaxed on firms classified in "SME growth markets", as defined in Article 33 of the European Union's Markets in Financial Instruments Directive (MIFID) II.

financial instrument carrying that risk. In addition, European ABS markets may be held back by the bad track record of structured credit securities created by the US sub-prime crisis, which could be addressed by enhanced transparency and comparability of risk characteristics across products and geographies. Authorities could develop a data warehouse containing standardised and granular information on firms' credit risk – in the short-run by granting non-bank investors access to existing national credit registers, and in the medium-run by developing a European credit register accessible to both bank and non-bank investors (Almeida and Damia, 2014).

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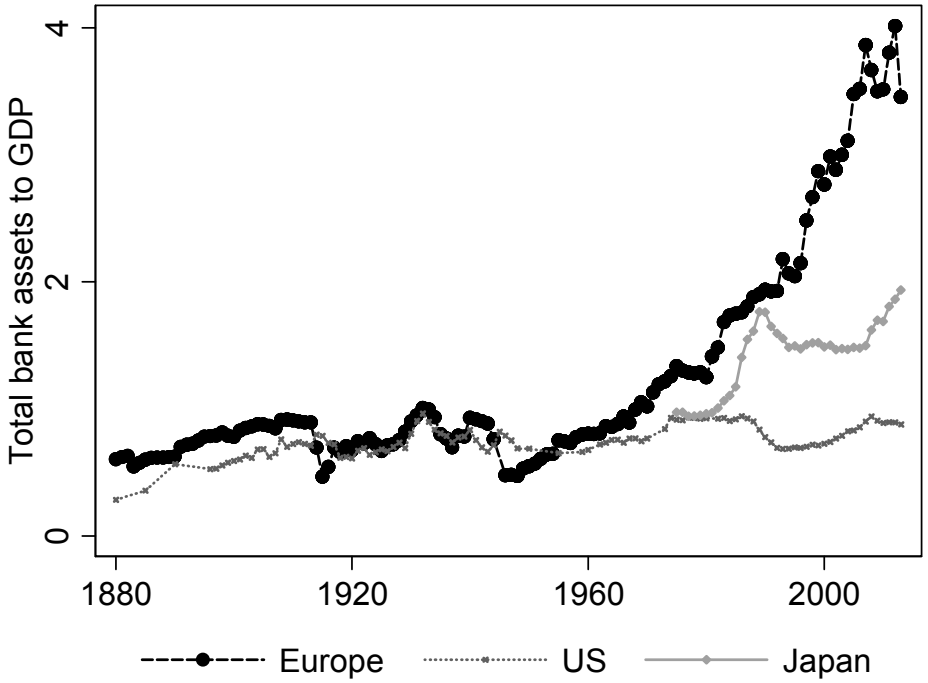
**Figure 1: Total bank assets to GDP in Europe, the US and Japan**

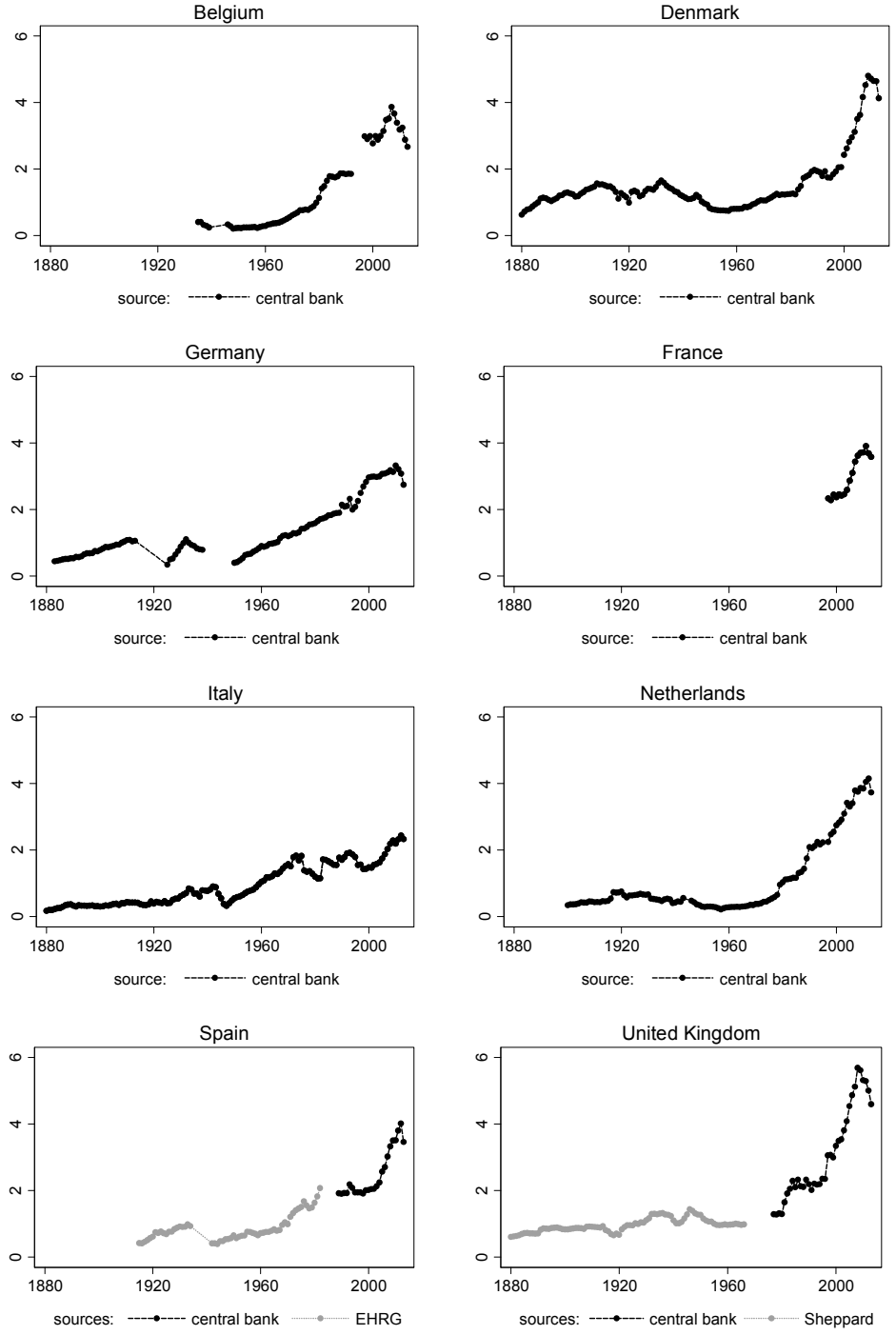



Notes: The "Europe" series represents the median of bank total assets to GDP in seven European countries for which reliable long time series data are available: Belgium, Denmark, Germany, Italy, the Netherlands, Spain and the UK. This median series tracks the (unreported) weighted mean very closely.

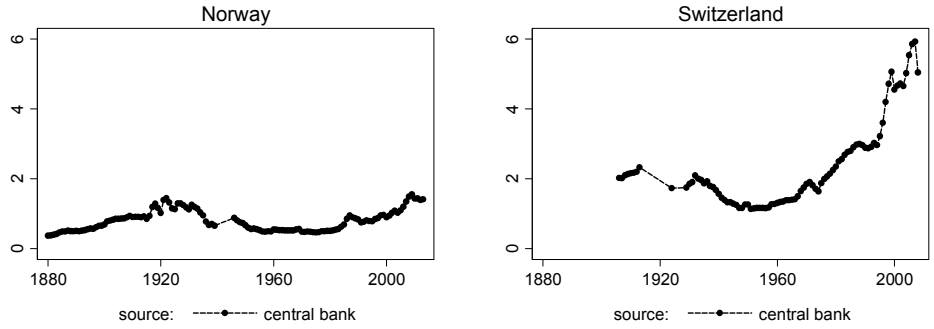
Sources: see endnote to Figure 2.

**Figure 2: Total bank assets to GDP**

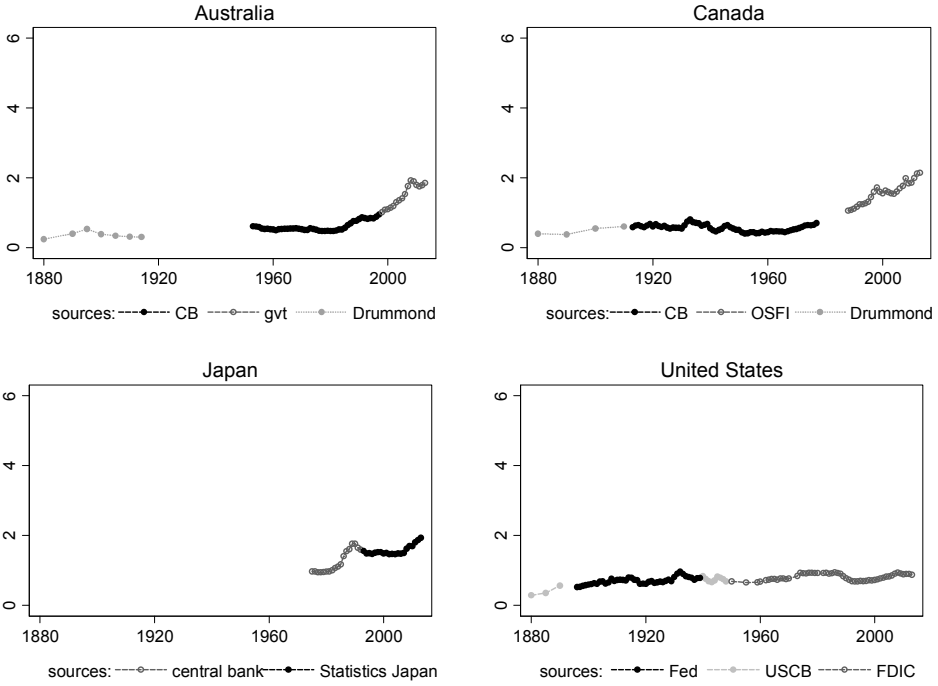
**Panel A: EU countries**



**Panel B: Non-EU European countries**




**Panel C: Non-European countries**




Detailed source list:

***Australia.*** Total bank assets: 1880, 1890, 1895, 1900, 1905, 1910, 1914: Drummond (1991); 1953-2013: Reserve Bank of Australia. Nominal GDP: 1880-2000: Mitchell (2008); 2001-2013: Australian Bureau of Statistics. ***Belgium.*** Total bank assets: *1935-1992*: National Bank of Belgium; *1997-2013*: ECB BSI. Nominal GDP: *1880-1994*: Smits, Woltjer and Ma (2009); *1995-2013*: National Bank of Belgium. ***Canada.*** Total bank assets: *1880, 1890, 1895, 1900, 1905, 1910, 1914*: Drummond (1991); *1913-1977* and *2003-2013*: Bank of Canada. Nominal GDP: *1880-1980*: Urquhart (1993) and Mitchell (2007b); *1981-2013*: Statistics Canada. ***Denmark.*** Total bank assets: *1880-2005*: Abildgren (2006); *2000-2013*: ECB BSI. Nominal GDP: *1880-2011*: Mitchell (2007a). ***France.*** Total bank assets: *1997-2013*: ECB BSI. Nominal GDP: *1880-1948:* Piketty and Zucman (2014); *1949-2013*: INSEE (Institut National de la Statistique et des Études Économiques). ***Germany.*** Total bank assets: *1883-1918* and *1925-1940* and *1950-2013*: Deutsche Bundesbank; *1997-2013*: ECB BSI. Nominal GDP: *1880-1913* and *1925-1938* and *1950-2006*: Mitchell (2007a); *2007-2013*: Statistisches Bundesamt. ***Italy.*** Total bank assets: *1880-2011*: Banca d'Italia; *1997-2013*: ECB BSI. Nominal GDP: *1880-1999*: Mitchell (2007a); *2000-2013*: ISTAT (Istituto Nazionale di Statistica). ***Japan.*** Total bank assets: *1975-1992*: Statistics Japan*; 1993-2013:* Bank of Japan. Nominal GDP: *1885-1954*:

Mitchell (2008); *1955-1993*: Japanese Statistics Bureau; *1994-2013*: Japanese Cabinet Office. ***Netherlands.*** Total bank assets: *1900-2013*: De Nederlandsche Bank; *1997-2013*: ECB BSI. Nominal GDP: *1900-2013*: De Nederlandsche Bank. ***Norway.*** Total bank assets: *1880-2013*: Norges Bank. Nominal GDP: *1880-2013:* Grytten (2004). ***Spain.*** Total bank assets: *1915-1934* and *1942-2000*: Economic History Research Group (EHRG). *1997-2013*: ECB BSI. Nominal GDP: *1880-1958*: Prados de la Escosura (2003); *1959-1994*: Mitchell (2007a); *1995-2013*: Instituto Nacional de Estadística. ***Switzerland.*** Total bank assets: *1906-2008*: Swiss National Bank. Nominal GDP: *1880-1913* and *1924* and *1929-2011*: Halbeisen, Müller and Veyrassat (2012). ***United Kingdom.*** Total bank assets: *1880-1966*: Sheppard (1971); *1977-2013*: Bank of England. Nominal GDP: *1880-1976*: Bank of England; *1977-2013*: Office for National Statistics. ***United States.*** Total bank assets: *1880, 1885, 1890:* 'Statistical Abstract of the United States'; *1896-1939:* 'All-bank Statistics, United States, 1896-1955', Board of Governors of the Federal Reserve System; *1940-1949:* 'Statistical Abstract of the United States'; *1950-1983:* 'Statistical Abstract of the United States' and FDIC; *1984-2013:* FDIC. Nominal GDP: *1880-1928*: Carter *et al* (2006); *1929-2013*: Bureau of Economic Analysis.

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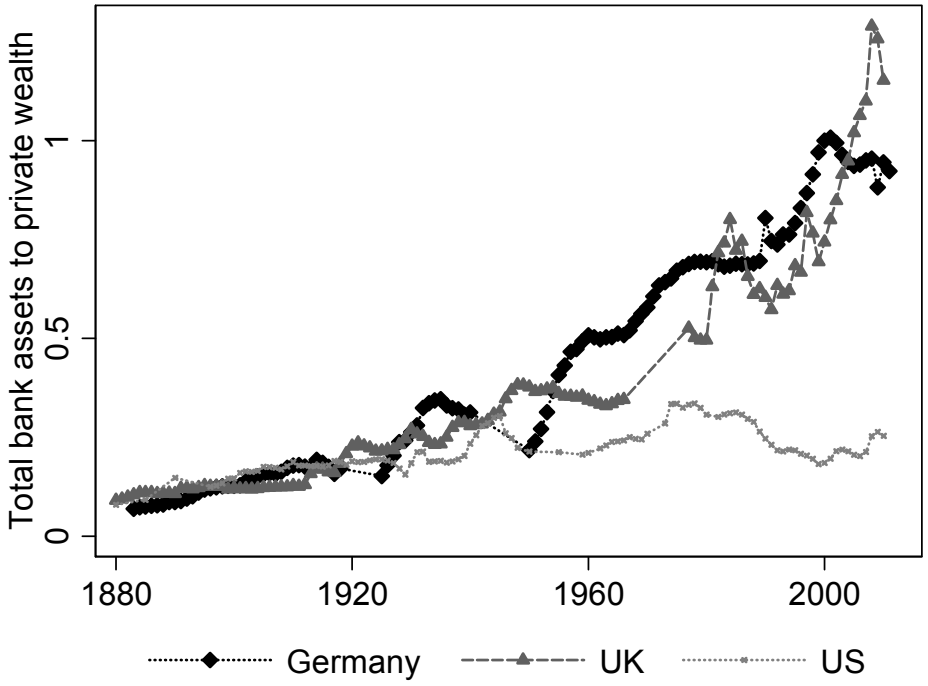
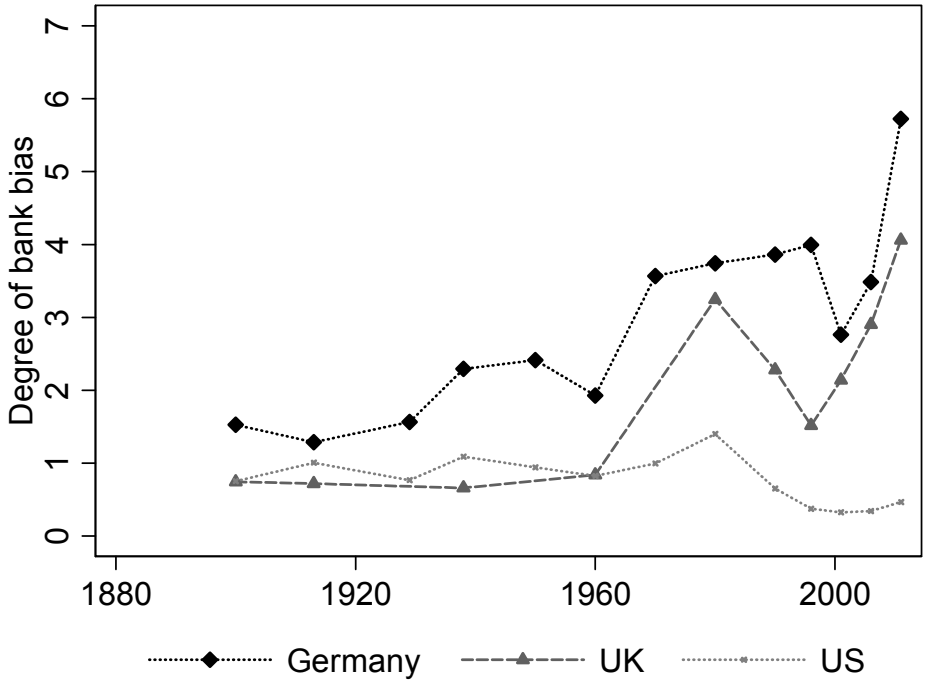
**Figure 3: Total bank assets to private wealth in Germany, the UK and the US**




Sources: Piketty and Zucman (2014) for private wealth data. German bank assets data are sourced from the Deutsche Bundesbank. UK bank assets data are sourced from Sheppard (1971) for 1880-1966 and from the Bank of England for 1977-2013. US bank assets data are sourced from the 'Statistical Abstract of the United States' for 1880, 1885 and 1890; from 'All-bank Statistics, United States, 1896-1955', published by the Board of Governors of the Federal Reserve System, for 1896-1939; from the 'Statistical Abstract of the United States' for 1940-1949; from the 'Statistical Abstract of the United States' and FDIC for 1950-1983; and from FDIC for 1984-2013.

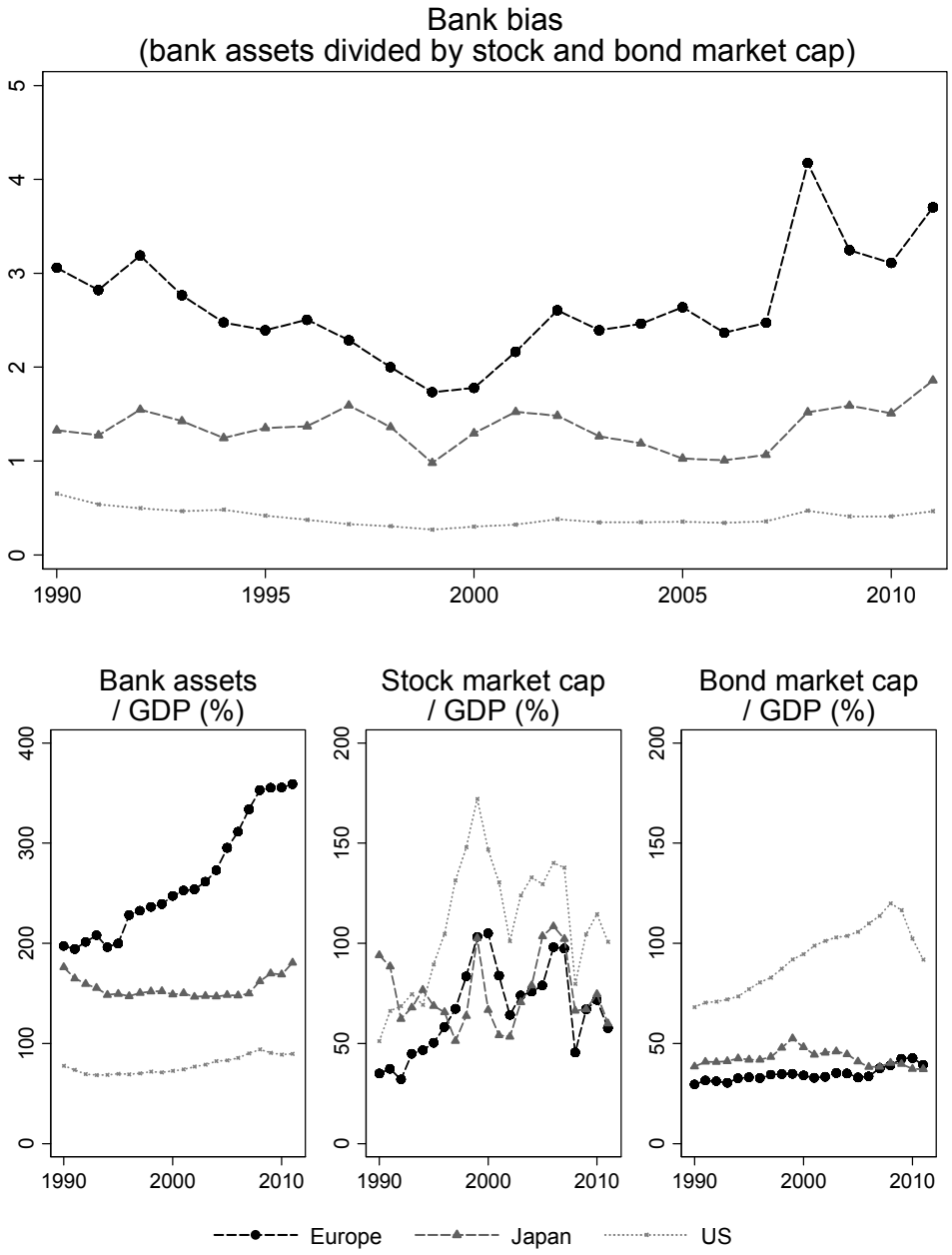
**Figure 4: Bank bias since 1900 in Germany, the UK and the US**




Notes: "Bank bias" is defined as the ratio of total bank assets to stock and bond market capitalisation.

Sources: Rajan and Zingales (2003) and World Bank for stock and bond market capitalisation data. German bank assets data are sourced from the Deutsche Bundesbank. UK bank assets data are sourced from Sheppard (1971) for 1880-1966 and from the Bank of England for 1977-2013. US bank assets data are sourced from the 'Statistical Abstract of the United States' for 1880, 1885 and 1890; from 'All-bank Statistics, United States, 1896-1955', published by the Board of Governors of the Federal Reserve System, for 1896-1939; from the 'Statistical Abstract of the United States' for 1940-1949; from the 'Statistical Abstract of the United States' and FDIC for 1950-1983; and from FDIC for 1984-2013.

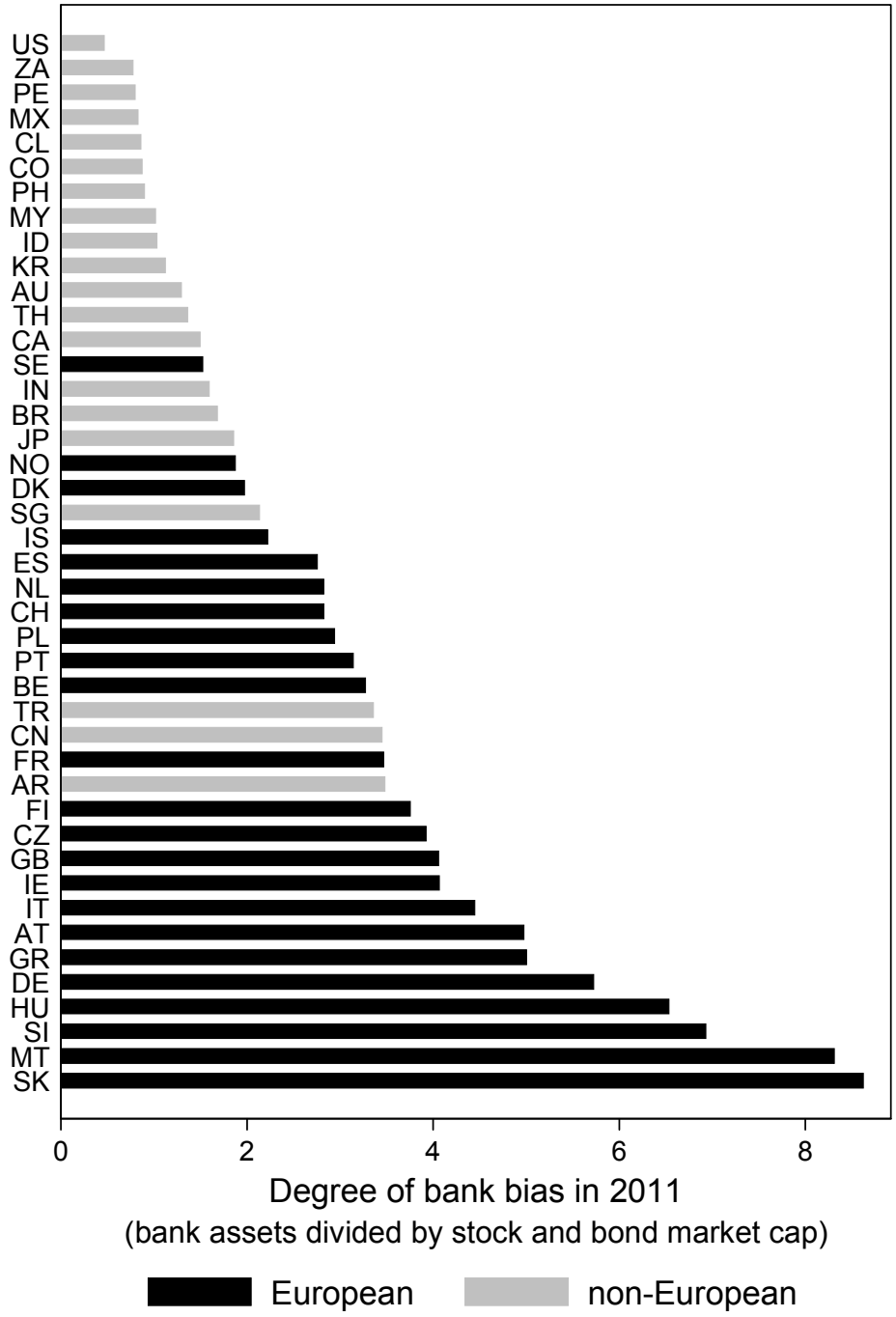
**Figure 5: Bank bias and its components since 1990 in Europe versus Japan and the US**




Notes: "Bank bias" is defined as the ratio of total bank assets to stock and bond market capitalisation. The "Europe" series is a composite of all countries in geographic Europe: that is, Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Sources: World Bank for stock and bond market capitalisation data. See endnote to Figure 2 for sources of bank assets data.

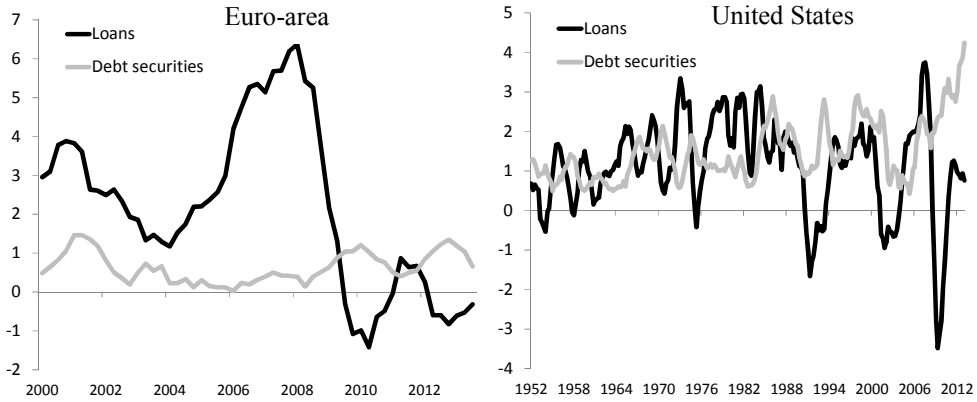
**Figure 6: Bank bias in 2011 in European countries versus the rest of the world**




Notes: "Bank bias" is defined as the ratio of total bank assets to stock and bond market capitalisation.

Source: World Bank; see endnote to Figure 2 for sources of bank assets data.

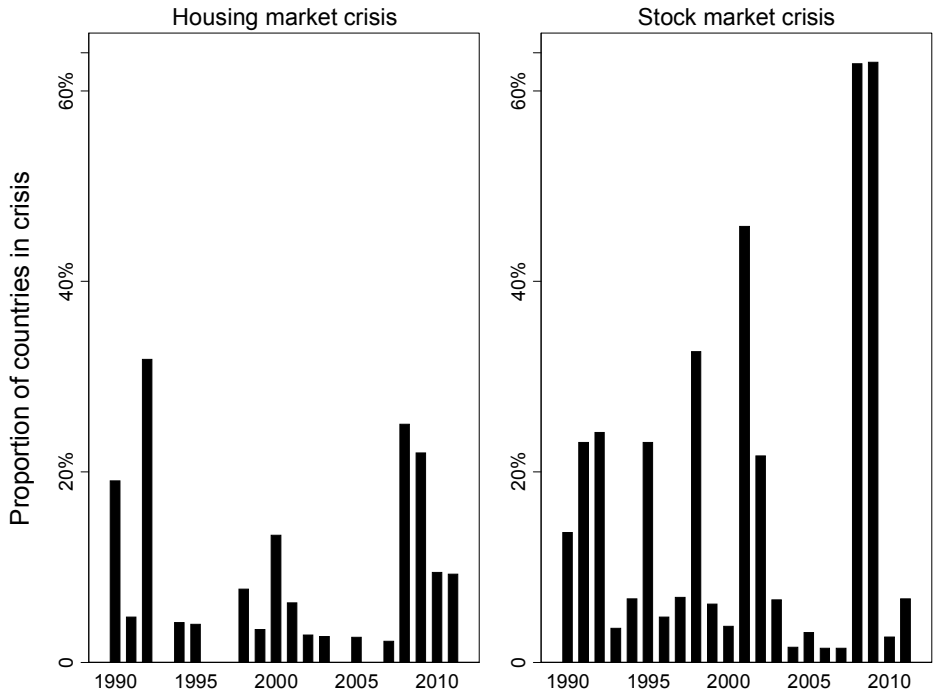
**Figure 7: Non-financial firms' financing in loans and debt securities**




Notes: The figures plot the year-on-year change in non-financial corporations' outstanding external liabilities (broken down as loans and debt securities) divided by nominal GDP. Loans exclude intra-NFC loans.

Sources: Left hand figure: ECB (Euro Area "Flow of Funds" Accounts). Right hand figure: Board of Governors of the Federal Reserve System (flow of funds accounts of the United States).

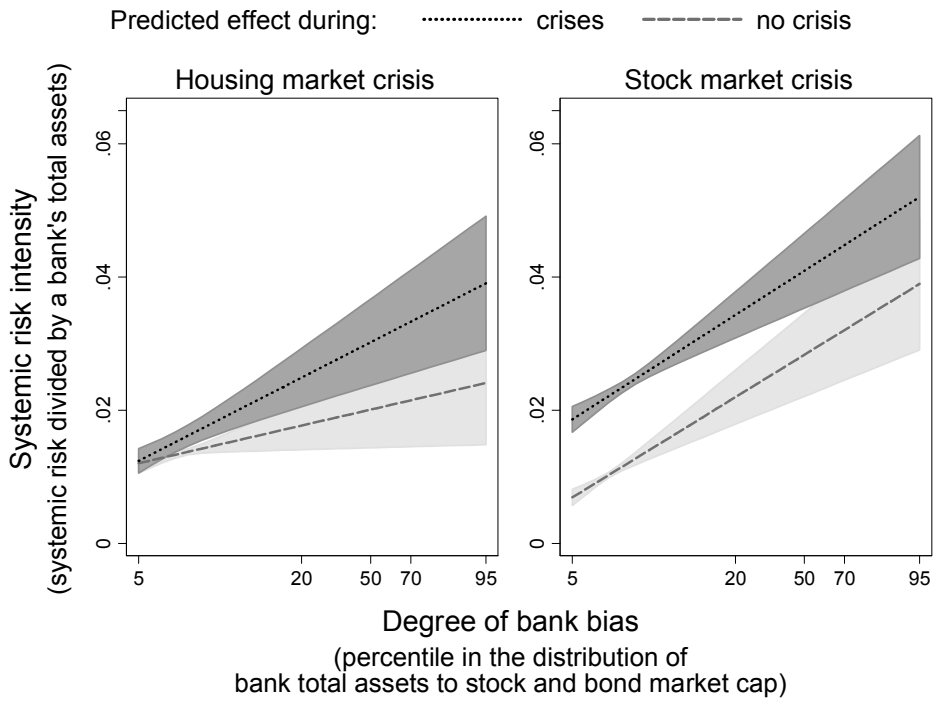
**Figure 8: Frequency of financial crises**




Notes: The vertical axis reports the percentage of country-year observations in which there was a financial crisis. Crises can take two forms: a "housing market crisis" is defined as a year in which a country's real house prices drop by at least 10%; and a "stock market crisis" is defined as a year in which a country's real stock prices drop by at least 20%.

Sources: World Bank.

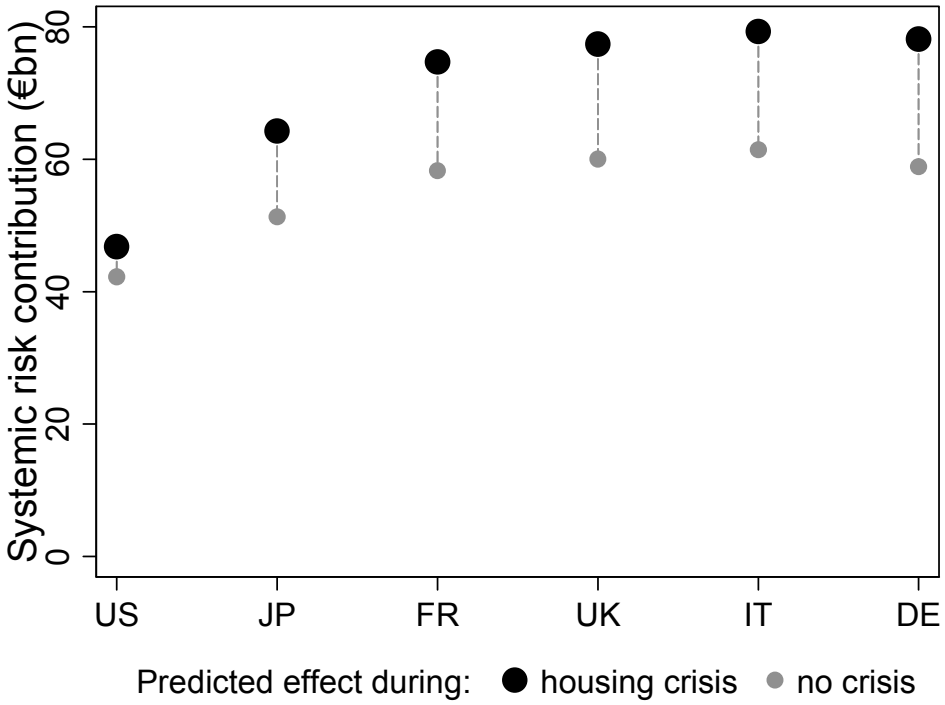
**Figure 9: Predicted effect of bank bias on systemic risk intensity**




Notes: "Bank bias" is a country-level variable defined as the natural logarithm of the ratio of total bank assets to stock and bond market capitalisation. High values therefore correspond to a bank-based financial structure. "Systemic risk intensity" is a bank-level variable defined as SRISK (calculated by NYU's V-Lab) divided by a bank's total assets. A "housing market crisis" is defined as a year in which a country's real house prices drop by at least 10%; and a "stock market crisis" is defined as a year in which a country's real stock prices drop by at least 20%. The shaded areas represent 90% confidence intervals around the predicted effect.

Sources: Bloomberg; World Bank; see endnote to Figure 2 for sources of bank assets data; see Table 2 for authors' calculations of the predicted effect.

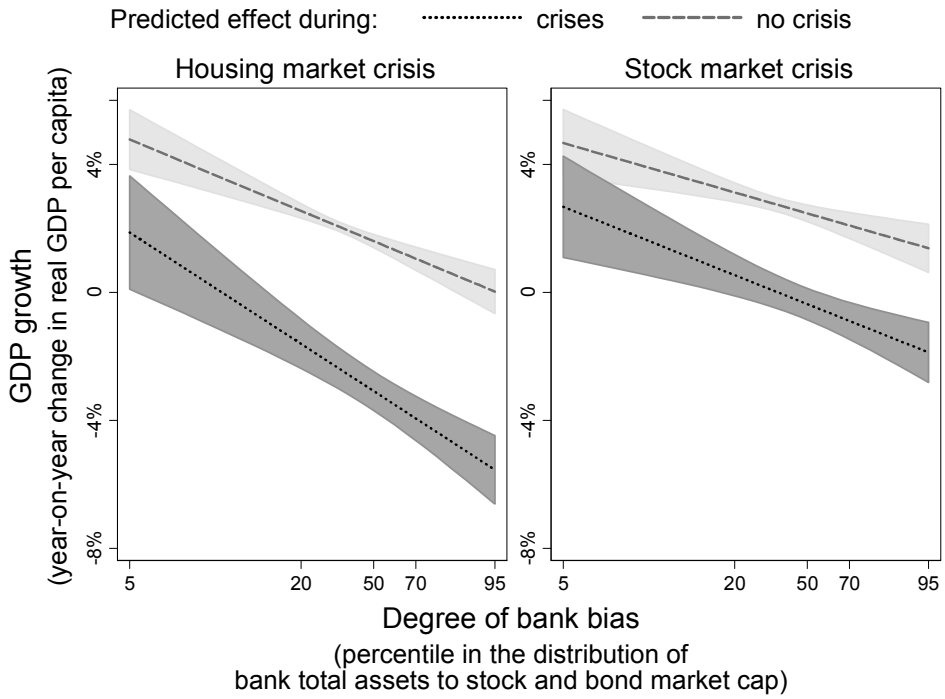
**Figure 10: Predicted systemic risk contribution of a €1tn bank**




Notes: The vertical axis shows the predicted exposure and contribution to systemic risk of a hypothetical large bank with total liabilities of €1tn. The predicted systemic risk varies over (i) the occurrence of a housing crisis (shown by the black versus grey circle); and (ii) the "bank bias" variable (shown over the horizontal axis). To illustrate the predicted effect, we take the observations on the "bank bias" variable in five countries in 2011: United States (with a "bank bias" of 0.4 in 2011), Japan (1.9), France (3.5), the United Kingdom (4.1) and Germany (5.7).

Sources: Bloomberg; World Bank; see endnote to Figure 2 for sources of bank assets data; see Table 2 for authors' calculations of the predicted effect.

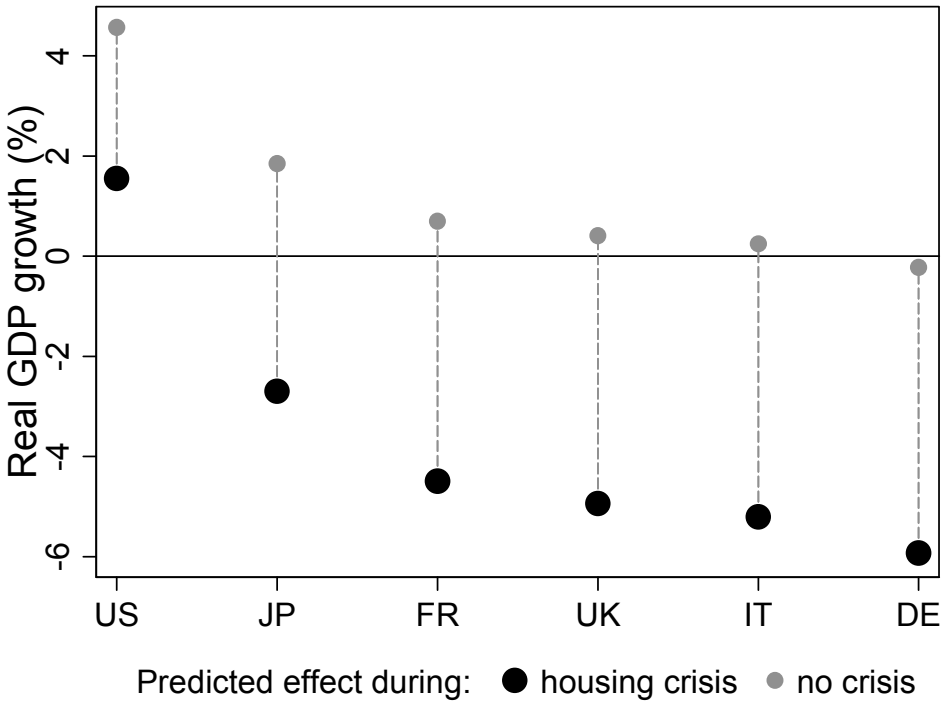
**Figure 11: Predicted effect of bank bias on GDP growth**




Notes: "Bank bias" is a country-level variable defined as the natural logarithm of the ratio of total bank assets to stock and bond market capitalisation. High values therefore correspond to a bank-based financial structure. "GDP growth" is the year-on-year change in real GDP per capita. A "housing market crisis" is defined as a year in which a country's real house prices drop by at least 10%; and a "stock market crisis" is defined as a year in which a country's real stock prices drop by at least 20%. The shaded areas represent 90% confidence intervals around the predicted effect.

Sources: World Bank; see endnote to Figure 2 for sources of bank assets data; see Table 3 for authors' calculations of the predicted effect.

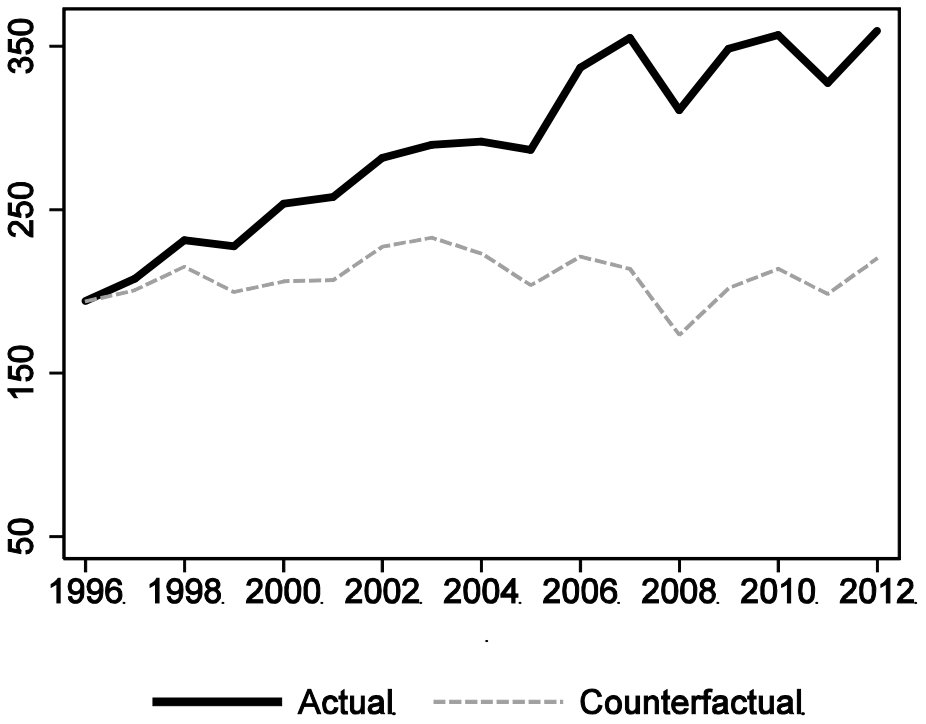
**Figure 12: Predicted marginal effect of bank bias on GDP growth**




Notes: The vertical axis shows the predicted yearly growth in real GDP per capita. Predicted GDP growth varies over (i) the occurrence of a housing crisis (shown by the black versus grey circle); and (ii) the "bank bias" variable (shown over the horizontal axis). To illustrate the predicted effect, we take the observations on the "bank bias" variable in five countries in 2011: United States (with a "bank bias" of 0.4 in 2011), Japan (1.9), France (3.5), the United Kingdom (4.1) and Germany (5.7).

Sources: World Bank; see endnote to Figure 2 for sources of bank assets data; see Table 3 for authors' calculations of the predicted effect.

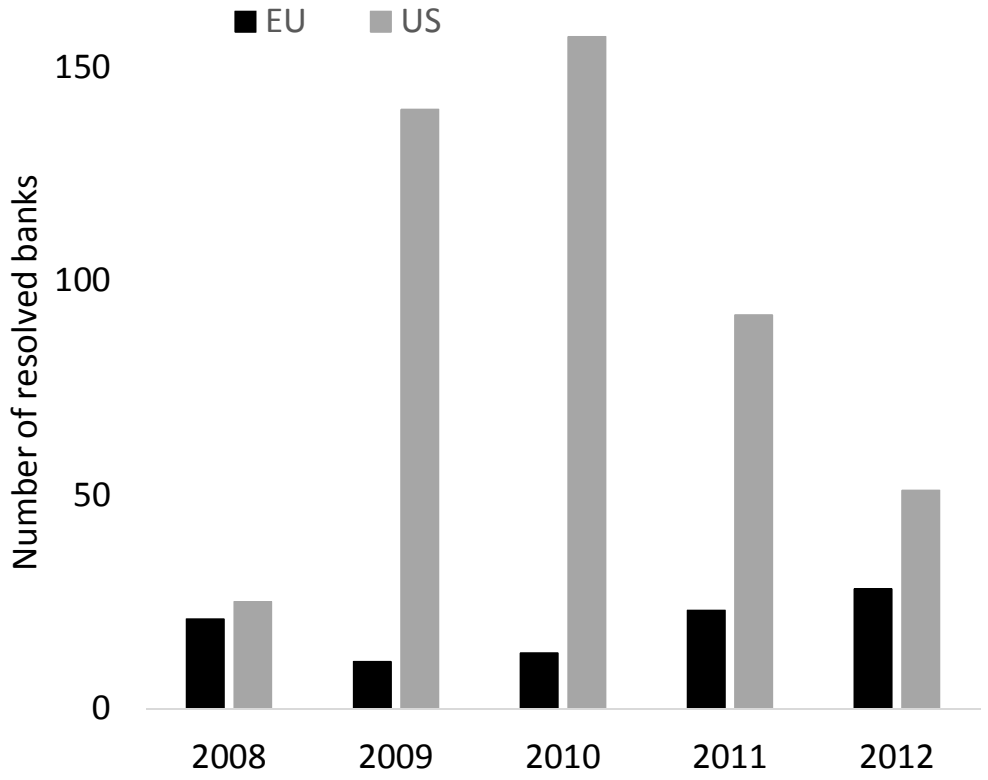
**Figure 13: Actual and "counterfactual" total banking system assets as a percentage of GDP**




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).

Sources: Bloomberg; own calculations.

**Figure 14: Bank resolution in the US and EU**




Notes: 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.

Sources: FDIC and Open Economics.

**Table 1: Banks' systemic risk intensity and countries' bank bias (country-level panel regressions)**

| | DV: Systemic risk intensity | | |
|---|---|---|---|
| | I | II | III |
| Bank bias | 0.0130*** | 0.00951*** | 0.00665*** |
| | (0.00223) | (0.00194) | (0.00227) |
| Bank size | | 0.00425*** | 0.00550*** |
| | | (0.000780) | (0.000808) |
| Bank size / GDP | | 0.0162*** | 0.0149*** |
| | | (0.00274) | (0.00286) |
| Leverage | | 0.000864*** | 0.000843*** |
| | | (5.68e-05) | (6.12e-05) |
| Real stock market return (YoY) | | | -0.000326*** |
| | | | (3.16e-05) |
| Real house price growth (YoY) | | | -0.000159*** |
| | | | (4.90e-05) |
| Constant | 0.0214*** | -0.0257*** | -0.0341*** |
| | (0.00212) | (0.00615) | (0.00640) |
| Year dummies | Yes | Yes | Yes |
| Bank-level fixed effects | Yes | Yes | Yes |
| Observations | 4,812 | 4,740 | 4,190 |
| R-squared | 0.387 | 0.436 | 0.480 |
| Number of unique banks | 510 | 506 | 473 |

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

Dependent variable: "Systemic risk intensity" is a bank-level variable defined as SRISK (i.e. a bank's systemic risk contribution, calculated by NYU's V-Lab) divided by a bank's total assets.

Independent variables: "Bank bias" is a country-level variable defined as the natural logarithm of the ratio of total bank assets to stock and bond market capitalisation, lagged by one year. "Bank size" is the natural logarithm of a bank's total liabilities (in USD), lagged by one year. "Bank size / GDP" is a bank's total liabilities (in USD) divided by the GDP of its country of residence, lagged by one year. "Leverage" is a bank's book value of assets divided by its book value of equity. "Real stock market return (YoY)" is the real year-on-year stock market return in a bank's resident country. "Real house price growth (YoY)" is the real year-on-year rate of house price growth in a bank's resident country.

**Table 2: Banks' systemic risk intensity during crises (country-level panel regressions)**

| | DV: Systemic risk intensity | |
|---|---|---|
| | Housing market crisis I | Stock market crisis II |
| Bank bias | 0.00467** | 0.0124*** |
| | (0.00211) | (0.00219) |
| Crisis dummy | 0.00883*** | 0.00439*** |
| | (0.00121) | (0.00122) |
| Bank bias × | 0.00565*** | 0.000515 |
| Crisis dummy | (0.000869) | (0.000547) |
| Bank size | 0.00519*** | 0.00607*** |
| | (0.000829) | (0.000826) |
| Bank size / GDP | 0.0164*** | 0.0150*** |
| | (0.00289) | (0.00289) |
| Leverage | 0.000766*** | 0.000853*** |
| | (6.13e-05) | (6.20e-05) |
| Constant | -0.0362*** | -0.0357*** |
| | (0.00655) | (0.00647) |
| Year dummies | Yes | Yes |
| Bank-level fixed effects | Yes | Yes |
| Observations | 4,266 | 4,190 |
| R-squared | 0.464 | 0.466 |
| Number of banks | 483 | 473 |

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

Dependent variable: "Systemic risk intensity" is a bank-level variable defined as SRISK (i.e. a bank's systemic risk contribution, calculated by NYU's V-Lab) divided by a bank's total assets.

Independent variables: "Bank bias" is a country-level variable defined as the natural logarithm of the ratio of total bank assets to stock and bond market capitalisation, lagged by one year. "Crisis dummy" adopts two definitions: in column I, it is equal to 1 when a country's real house prices drop by at least 10%, and 0 otherwise; in column II, it is equal to 1 when a country's real stock prices drop by at least 20%, and 0 otherwise. "Bank size" is the natural logarithm of a bank's total liabilities (in USD), lagged by one year. "Bank size / GDP" is a bank's total liabilities (in USD) divided by the GDP of its country of residence, lagged by one year. "Leverage" is a bank's book value of assets divided by its book value of equity.

**Table 3: GDP growth and bank bias (country-level panel regressions)**

| | DV: GDP growth | | |
|---|---|---|---|
| | No crisis | Housing market crisis | Stock market crisis |
| | I | II | III |
| Bank bias | -0.0157*** | -0.0185*** | -0.0127*** |
| | (0.00290) | (0.00315) | (0.00344) |
| Crisis dummy | | -0.0287*** | -0.0118** |
| | | (0.00451) | (0.00481) |
| Bank bias × | | -0.0101** | -0.00484 |
| Crisis dummy | | (0.00396) | (0.00393) |
| Constant | -0.0101 | -0.0188 | -0.00147 |
| | (0.0252) | (0.0185) | (0.0255) |
| Year dummies | Yes | Yes | Yes |
| Country-level fixed effects | Yes | Yes | Yes |
| Observations | 705 | 536 | 565 |
| No. of countries | 45 | 42 | 38 |

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

Dependent variable: "GDP growth" is a country-level variable defined as the year-on-year growth in real GDP per capita.

Independent variables: "Bank bias" is a country-level variable defined as the natural logarithm of the ratio of total bank assets to stock and bond market capitalisation, lagged by one year. "Crisis dummy" adopts two definitions: in column II, it is equal to 1 when a country's real house prices drop by at least 10%, and 0 otherwise; in column III, it is equal to 1 when a country's real stock prices drop by at least 20%, and 0 otherwise.

**Table 4: Robustness: long lags on the bank bias variable (country-level panel regressions)**

| | DV: GDP growth | | | |
|---|---|---|---|---|
| | 3-year moving average | 5-year moving average | 10-year moving average | 15-year moving average |
| | I | II | III | IV |
| Bank bias | -0.0171*** | -0.0132*** | -0.0106*** | -0.0152*** |
| | (0.00302) | (0.00321) | (0.00381) | (0.00459) |
| Constant | 0.00758 | 0.0171 | 0.0243 | 0.0175 |
| | (0.0255) | (0.0257) | (0.0259) | (0.0262) |
| Year dummies | Yes | Yes | Yes | Yes |
| Country-level fixed effects | Yes | Yes | Yes | Yes |
| Observations | 758 | 768 | 783 | 790 |
| R-squared | 0.350 | 0.334 | 0.322 | 0.330 |
| Number of countries | 45 | 45 | 45 | 45 |

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

Dependent variable: "GDP growth" is a country-level variable defined as the year-on-year growth in real GDP per capita.

Independent variables: "Bank bias" is a country-level variable defined as the natural logarithm of the ratio of total bank assets to stock and bond market capitalisation. In column I, this variable is calculated as the three-year (backward-looking) moving average; in column II, this variable is calculated as the five-year moving average; in column III, this variable is calculated as the 10-year moving average; and in column IV, this variable is calculated as the 15-year moving average.

**Table 5: Instrumental variable country-level panel regressions using measures of reforms of financial regulation as instruments**

| | DV: GDP growth | | |
|---|---|---|---|
| | No crisis | Housing market crisis | Stock market crisis |
| | I | II | III |
| Bank bias | -0.0294*** | -0.0109 | -0.0460*** |
| | (0.0107) | (0.0117) | (0.0123) |
| Crisis dummy | | -0.0168* | -0.0199** |
| | | (0.00930) | (0.00967) |
| Bank bias × Crisis dummy | | -0.0276** | 0.00343 |
| | | (0.0116) | (0.00960) |
| Constant | 0.0295*** | 0.0165* | 0.0482*** |
| | (0.0109) | (0.00955) | (0.0131) |
| Year dummies | Yes | Yes | Yes |
| Country-level fixed effects | Yes | Yes | Yes |
| Observations | 392 | 307 | 324 |
| Number of countries | 23 | 22 | 20 |

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

Specification: Instrumental variable country-level panel regressions, with country-level fixed effects. The table reports the second-stage instrumental variable regression. The following country-level variables are used as instruments in the first-stage regression: a measure of the strength and intrusiveness of banking sector supervision; a measure of security market liberalisation; a measure of ceilings on bank credit; a measure of interest rate liberalisation; a measure of privatisation of banks; and a measure of barriers to entry to the banking sector. All instruments are taken from Abiad, Detragiache and Tressel (2008).

Dependent variable: "GDP growth" is a country-level variable defined as the year-on-year growth in real GDP per capita.

Independent variables: "Bank bias" is a country-level variable defined as the natural logarithm of the ratio of total bank assets to stock and bond market capitalisation. "Crisis dummy" adopts two definitions: in column II, it is equal to 1 when a country's real house prices drop by at least 10%, and 0 otherwise; in column III, it is equal to 1 when a country's real stock prices drop by at least 20%, and 0 otherwise.

**Table 6: Instrumental variable country-level panel regressions using measures of real economy structure as instruments**

| | DV: GDP growth | | |
|---|---|---|---|
| | No crisis | Housing market crisis | Stock market crisis |
| | I | II | III |
| Bank bias | -0.0950*** | -0.00585 | -0.177* |
| | (0.0308) | (0.0122) | (0.0961) |
| Crisis dummy | | -0.00781 | 0.0678 |
| | | (0.0115) | (0.0631) |
| Bank bias × | | -0.0428*** | -0.0941 |
| Crisis dummy | | (0.0151) | (0.0742) |
| Constant | 0.114*** | 0.0155 | 0.199** |
| | (0.0326) | (0.0107) | (0.0962) |
| Year dummies | Yes | Yes | Yes |
| Country-level fixed effects | Yes | Yes | Yes |
| Observations | 585 | 451 | 486 |
| Number of countries | 44 | 39 | 37 |

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

Specification: Instrumental variable country-level panel regressions, with country-level fixed effects. The table reports the second-stage instrumental variable regression. The following country-level variables are used as instruments in the first-stage regression: total spending on research and development in the manufacturing sector as a proportion of total manufacturing sector output; and value-added in the manufacturing sector as a proportion of GDP.

Dependent variable: "GDP growth" is a country-level variable defined as the year-on-year growth in real GDP per capita.

Independent variables: "Bank bias" is a country-level variable defined as the natural logarithm of the ratio of total bank assets to stock and bond market capitalisation. "Crisis dummy" adopts two definitions: in column II, it is equal to 1 when a country's real house prices drop by at least 10%, and 0 otherwise; in column III, it is equal to 1 when a country's real stock prices drop by at least 20%, and 0 otherwise.