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Marco Pagano

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Lessons from the European Financial Crisis

Marco Pagano

University of Naples Federico II, CSEF, EIEF and CEPR

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Abstract

This paper distils three lessons for bank regulation from the experience of the 2009-12 euro-area financial crisis. First, it highlights the key role that sovereign debt exposures of banks have played in the feedback loop between bank and fiscal distress, and inquires how the regulation of banks' sovereign exposures in the euro area should be changed to mitigate this feedback loop in the future. Second, it explores the relationship between the forbearance of non-performing loans by European banks and the tendency of EU regulators to rescue rather than resolving distressed banks, and asks to what extent the new regulatory framework of the euro-area "banking union" can be expected to mitigate excessive forbearance and facilitate resolution of insolvent banks. Finally, the paper highlights that capital requirements based on the ratio of Tier-1 capital to banks' risk-weighted assets were massively gamed by large banks, which engaged in various forms of regulatory arbitrage to minimize their capital charges while expanding leverage. This argues in favor of relying on a set of simpler and more robust indicators to determine banks' capital shortfall, such as book and market leverage ratios.

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“Every cloud has a silver lining”: just as going through a serious illness may vividly impress on us the need for a healthier lifestyle, nothing like the frightening turbulence and the social costs of a financial crisis can focus our minds on the flaws of financial regulation and supervision that triggered it, and on the need for financial reform. This paper is precisely such a stock-taking exercise: it attempts to identify some of the regulatory failures that contributed to the severity of the euro debt crisis of 2009-12, and to suggest how such failures might be remedied or assess whether ongoing reforms are moving in the right direction and are likely to go far enough.

Without making any claim to completeness, this paper focuses on three main features of the 2009-12 euro debt crisis, and trace the roots of each to flaws in European financial regulation.

Section 1 of the paper highlights the key role that sovereign debt exposures of banks have played in the feedback loop between bank and fiscal distress, and inquires how the regulation of banks’ sovereign exposures in the euro area could be changed to mitigate this feedback loop in the future. Section 2 explores the relationship between the forbearance of non-performing loans by European banks and the tendency of EU regulators to rescue rather than resolve distressed banks, and asks to what extent the new regulatory framework of the euro-area “banking union” can be expected to mitigate excessive forbearance and facilitate resolution of insolvent banks. Finally, Section 3 argues that basing capital requirements on the ratio of Tier-1 capital to risk-weighted assets created regulatory loopholes that large banks exploited to expand leverage, and that simpler and more robust indicators – such as the leverage ratio – might be a better gauge of banks’ capital shortfall.

1. Bank-sovereign feedback loop and regulation of banks’ sovereign exposures

The feedback loop between sovereigns and banks has been the hallmark of the euro-area debt crisis. The sovereign exposures of banks to high-yield, high-risk sovereign debt have contributed to this feedback loop: drops in the price of debt issued by distressed governments lowered the equity value of banks with large exposures to such debt; this threatened their solvency, and induced investors to expect governments to bail them out, which in turn exacerbated stress in sovereign debt markets.

The initial trigger differed across countries. For instance, in Greece the initial trigger was the investors’ concern over sovereign solvency in November 2009, when the new government revealed that the fiscal deficit was twice as large as previously believed: this triggered a collapse of Greek debt

prices, reflecting concerns of a sovereign default, which in turn led to the distress of Greek banks. Conversely, in Ireland the crisis originated in the banking sector and spilled over to the sovereign debt market, as the government bailed out several Irish banks: by the end of 2010 the spread on Irish sovereign debt rose sharply, and eventually the government lost access to private markets, with spreads over German bunds reaching 600 basis points.

Another feature of the euro-area debt crisis is its international contagion dimension: first, banks were exposed to the sovereign risk of other countries; second, distress by one sovereign led investors to reassess the risk of other sovereigns. For instance, in March 2010 investors became increasingly concerned that a default by the Greek government would undermine the stability of euro-area banks holding Greek sovereign debt; at the same time, the news from Greece acted as a “wake-up call”, leading investors to reassess the credit risk of other euro-area sovereigns with less severe but similar fiscal problems, such as Portugal and Ireland, and even Italy and Spain – the entire so-called “euro-area periphery”. This re-pricing of all periphery debt in turn had further repercussions on the solvency of euro-area banks, both because of their direct exposures to periphery sovereigns and because rating downgrades of this debt crippled the euro interbank lending market, for fear that the European Central Bank (ECB) would no longer accept it as collateral from banks.

Indeed, cross-border contagion during the crisis was so strong that it started raising doubts about the very survival of the euro: under the rules of the monetary union, euro-area distressed sovereigns cannot resort to money creation to bail out banks in their jurisdictions (unlike, say, the US and the UK), and therefore investors started fearing that one or more of them would eventually break away from the Economic and Monetary Union (EMU), and restore national currencies. The risk of euro-area breakup and devaluation of periphery countries’ future currencies vis-à-vis those of core countries determined a strong co-movement in sovereign yield differentials and CDS sovereign premia (Battistini, Pagano and Simonelli, 2014). Media, investors and academics repeatedly voiced concerns about the possible breakup of the EMU. Between late 2010 and 2011 four issues of *The Economist* featured cover illustrations referring to its breakup. In November 2011 the managers of several multinational companies disclosed euro-breakup contingency plans. Between April 2010 and July 2012, Paul Krugman regularly prognosticated the collapse of the euro from his columns in *The New York Times*. At the 2012 World Economic Forum meeting in Davos, Nouriel Roubini predicted that

Greece would leave the euro-area in the subsequent 12 months, followed by Portugal, and assessed at 50% the chance that the euro area would break up in the subsequent three to five years. Even ECB President Mario Draghi pointed to the effect of redenomination risk on sovereign yield differentials when he stated in a speech on 26 July 2012 that “the premia that are being charged on sovereign states borrowings ... have to do more and more with convertibility, with the risk of convertibility”.

1.1. Sovereign exposures and bank risk

This brief account highlights the extent to which systemic risk during the crisis was amplified by the exposure of euro-area banks to euro-area sovereigns, and especially by the exposure of banks in the euro-area periphery towards their domestic sovereign. Due to this strong home bias, the price drop of periphery sovereign debt in 2010-12 inflicted severe losses to the banks in those countries (and, conversely, the post-2012 price recovery of periphery sovereign debt paid them handsome profits).

This is illustrated by the fact that, during the crisis, time-varying correlations between the returns on bank stocks and the returns on the respective country’s domestic sovereign debt are associated with the aggregate size of the respective banks’ domestic sovereign exposures, scaled by total assets. Figures 1 and 2 present the resulting evidence, for periphery and for core banks respectively. Each graph in the figures shows two lines. The solid line is the moving correlation between bank-sector monthly stock returns and the 10-year domestic sovereign debt return for that country, from January 2001 to May 2011 (both drawn from Datastream). The observation for each date is the correlation computed using the returns for the 24 months centered on that date (the 11 previous months, the current month and the 12 subsequent months). This correlation is measured on the left axis of each graph on a common scale for all countries. The dashed line in each graph plots instead the domestic sovereign debt exposures of the banks in that country from January 2001 to March 2012 (drawn from the Statistical Data Warehouse – SDW – of the ECB). Sovereign exposures are measured on the right axis, again on a common scale for all countries (except Greece), and are scaled by total bank assets.

Figure 1 shows that in the euro-area periphery the correlation between bank stock returns and sovereign debt returns is typically negative or zero before 2009, when in this area banks were reducing their domestic sovereign exposures. The correlation turns positive (and statistically significant) in late 2008 in Greece, Ireland, Italy and Portugal, and in 2009 in Spain, and subsequently

tends to increase, as banks in these countries increase their domestic sovereign exposures. From June 2010 to May 2011, the correlation between stock and sovereign debt returns becomes on average 37% in Greece, 28% in Ireland, 39% in Italy, 37% in Portugal, and 53% in Spain¹, all significantly different from zero at the 1% confidence level.

Figure 2 shows that instead the correlation between core-country bank stock returns and core sovereign debt returns is negative or zero throughout the sample period, while the sovereign exposures of core-country banks stay small throughout the sample period, except in Belgium. The only case in which the correlation turns large and positive is Belgium in the late 2010 and early 2011, when it is on average 44% between January and April 2011. Interestingly, in this period Belgium is the only core country whose banks increase their domestic sovereign exposures above the 5% mark.

This evidence is consistent with the findings of Acharya and Steffen (2013), who find that the factor loadings of bank-level returns on the difference between periphery and core sovereign debt returns are positively correlated with cross-sectional snapshots of sovereign exposures for a sample of 50 publicly listed banks subjected to the stress tests of the European Banking Authority (EBA) in July 2010, July 2011 and December 2011. More specifically, they find that Greek, Italian and Spanish banks with higher sovereign holdings at the date of the EBA stress test have stock returns that load more heavily on the bond return of their respective sovereign.

Of course, banks' sovereign exposures are not the only factor explaining the correlation between bank and sovereign distress. Other obvious sources of connection are (i) the reliance of banks, especially systemically important ones, on their respective sovereigns as ultimate backstops in case of insolvency, and (ii) the severe recession, especially in the euro-area periphery, which obviously worsened both the performance of banks' loan portfolios and the fiscal position of the corresponding sovereigns. But the evidence shown above suggests that banks' domestic sovereign exposures did play a specific role, especially in the countries of the euro-area periphery.

¹ The only instance in which the correlation is positive and large before 2008-09 is in Portugal during 2004, when Portuguese banks sovereign holdings were still below 2%.

1.2. Changes in banks' sovereign exposures and in sovereign yields

Figures 1 and 2 also show that, at the aggregate level, the domestic sovereign exposures of euro-area banks (shown as the dashed lines) have changed considerably since the inception of the euro: in both groups of countries, they were considerably larger at the inception of the EMU than they are now, but increased again after 2008, and more so in periphery countries than in core ones. Indeed, as argued above, the post-2008 increase in the home bias of banks' sovereign exposures in the euro-area periphery strengthened the impact of sovereign price shocks on their asset values.

Were these changes in the domestic sovereign exposures of banks related to the concomitant changes in sovereign yield differentials? Battistini, Pagano and Simonelli (2014) find that, in general, they were: banks invested more in their home sovereign's debt when its yield increased. They also explore how the changes in domestic exposures responded to two components of yield differentials: a common (or systemic) component, which they interpret as reflecting mainly the risk of euro collapse (i.e., a redenomination risk premium), and a country-specific component, driven mainly by country-level changes in sovereign risk. This decomposition allows them to discriminate to some extent between three different reasons why banks may have changed their domestic sovereign exposures in response to a widening differential between the domestic yield and the euro-area swap rate:

1. Distressed sovereign issuers may exert "moral suasion" on the banks in their jurisdiction to increase their domestic sovereign holdings, in order to support demand for sovereign debt when it is low and thus yields are comparatively high.
2. Undercapitalized banks may bet for resurrection by engaging in "carry trades" whereby they go long on high-risk, high-yield sovereign debt, and fund such exposures either by going short on low-yield debt or by borrowing from the ECB, consistently with the bank-level evidence in Acharya and Steffen (2013) and Drechsler et al. (2013): insofar as most undercapitalized banks are in periphery countries, this may result in a home bias in the sovereign portfolios of periphery-country banks.
3. In the event of a collapse of the euro, bank liabilities in each country would be redenominated into new national currencies, and so would their holdings of domestic sovereign debt. Hence, domestic banks are better hedged than foreign ones against the redenomination risk of domestic sovereign debt: they have a "comparative advantage" in bearing this risk. Thus banks' home bias should be

correlated with the common component of sovereign risk, but not with its purely country-specific component, which instead should equally affect domestic and foreign investors.

All three stories – the “moral suasion”, the “carry-trade” and the “comparative advantage” hypothesis – share a common prediction: the home bias in banks’ sovereign portfolios should be positively correlated with sovereign yield differentials. However, the first two hypotheses predict that this correlation should arise irrespective of whether changes in yields are generated by country-level or common risk; in contrast, the third predicts that this correlation should arise *only* from changes in common risk, e.g. the risk of collapse of the euro. Moreover, since during the crisis sovereign risk and yields increased appreciably only in the euro-area periphery, the first two hypotheses can only apply to periphery-country banks, while the third may also apply to core countries.

As already mentioned, Battistini, Pagano and Simonelli (2014) find that the sovereign exposures of euro-area banks respond positively to increases in yields in most countries, except Belgium, France and the Netherlands. But this pattern stems from a very different response of sovereign exposures to the country risk factor in the core and in the periphery:

- (i) in most periphery countries banks respond to increases in the country risk factor by *raising* their domestic exposure, while in core countries they do not;
- (ii) in contrast, in almost all countries banks increase their domestic exposures in response to an increase in the common risk factor.

Finding (i) suggests that, for periphery-country banks, and only for those, there is also evidence in support of the “moral suasion” and/or the “carry-trade” hypothesis, since these banks increase their exposures in response to increases in country-level sovereign risk, not just in response to systemic euro-area risk. Periphery banks appear to behave as if they were less risk averse than other investors, reflecting either government-dictated or opportunistic risk-taking incentives.

Finding (ii) indicates that, when systemic risk increases, most banks – both in core and in periphery countries – increase their domestic sovereign holdings. This suggests that increased risk of euro collapse and currency redenomination has contributed to the increase in the home bias of banks’ sovereign portfolios – in core countries being its only determinant.

1.3. Implications for the regulation of banks' sovereign exposures

Suppose that finding (i) were to reflect moral suasion by their regulator, concerned by the domestic sovereign's distress. Under this interpretation, regulators themselves prompted banks to increase their domestic sovereign exposures in situations where government solvency was already at danger, thus enhancing the feedback loop between fiscal solvency and bank solvency deterioration. This problem, if present, should be mitigated by the introduction of the euro-area banking union: the ECB acting as "single supervisor" should be more insulated from the pressures of national governments than national prudential supervisors. The rationale for this impending policy change is reinforced by the fact that it has become clear that, when euro-area governments are fiscally distressed, they are no longer the only ultimate backstops of their domestic banks, as illustrated by the contribution of the European Stability Mechanism (ESM) to the recapitalization of Spanish banks since late 2012: it is then consistent that, ex ante, an euro-area bank supervisor should constrain the bets that euro-area banks can take on the bonds issued by their distressed sovereign.

Finding (i) by Battistini et al. (2014) could also be interpreted as indicating that periphery banks increased their sovereign exposures to search for yield, especially since most of these banks were undercapitalized and could borrow cheaply from the ECB: if successful, their sovereign-debt carry trades would help them to shore up their capital ratios. Indeed, Acharya and Steffen (2013) and Buch, Koetter and Ohls (2013) provide evidence that banks that were less capitalized and more dependent on wholesale funding invested more in sovereign debt than others. A variant of this "carry trade" story, popular among euro-area bankers, goes as follows: "if my sovereign defaults, also my bank does, so I can ignore my own sovereign's default risk". This argument may contribute to explain why carry trades by banks have been far more prevalent in fiscally distressed countries than in fiscally sound ones. While such behavior may appear rational from a bank's individual standpoint, it is no less inefficient for society than if it were motivated by plain moral hazard: it leads the banks of the fiscally distressed country to overexpose themselves to sovereign risk, and thus it also makes them more likely to require a bailout in the event of an increase in domestic yields. Insofar as this increases their demands on the public finances of their country in bad states of the world, it also exacerbates the

chances that their sovereign will be distressed. In other words, however motivated, banks' carry trades strengthen the feedback loop between financial instability and fiscal distress.

Discouraging carry trades would require revising the prudential regulation of sovereign exposures in the euro area, by scrapping the current preferential treatment of sovereign exposures: currently, euro-area banks face no capital requirement (a "zero risk weight") for holdings of sovereign euro-area debt, irrespective of its issuer; moreover, sovereign holdings are exempted from the "large exposures regime", which limits exposures to a single counterparty to a quarter of their eligible capital. Such regulation makes it particularly attractive for euro-area banks to invest in high-yield euro-denominated sovereign debt, especially considering that they can fund such investments by borrowing at low rates from the ECB.

In principle, such carry trades can be discouraged by imposing either positive risk weights on sovereign debt in computing banks' capital or limits on banks' exposure towards each single sovereign issuer, thus requiring them to diversify their sovereign portfolios. Each of these two choices has its own problems: on one hand, the responsiveness of banks' portfolio choices to risk weights on sovereign exposures is unknown, and in practice may be quite low in the presence of very profitable carry trades; on the other hand, setting limits to exposures vis-à-vis each single sovereign issuer may require most euro-area banks to undertake substantial portfolio adjustments, which may result in gyrations in relative yields in the euro-area sovereign debt market.

However, there are ways to guide the banks' portfolio reallocation process smoothly in the direction of greater diversification: for instance, the limit on sovereign exposures could be phased in very gradually; moreover, euro-area banks may be exempted from this limit altogether if they invest in a well-diversified portfolio of euro-area sovereign bonds rather than in those issued by a specific sovereign. In this respect, the portfolio reallocation process could be made smoother by the introduction of European Safe Bonds, as proposed by the Euro-nomics Group (see <http://euromomics.princeton.edu/>): a European Debt Agency (EDA) could buy a GDP-weighted portfolio of bonds from euro-area sovereigns, and use them as collateral to issue two securities. The first security, European Safe Bonds (ESBies), would be a senior claim on the payments from the sovereign bonds held in the portfolio. The second security, European Junior Bonds, would be a junior claim on these payments – that is, it would be first in line to absorb losses arising from the pool of

sovereign bonds that serve as collateral for these issues. Owing to the diversification of country-specific risk and to their seniority, ESBies would have virtually no exposure to sovereign risk, and therefore would be an ideal asset for euro-area banks to diversify their sovereign portfolios.

Finally, it is worth asking which are the policy implications of the finding (ii) described above – namely, that even in core countries euro-area banks have responded to greater common (or redenomination) risk by increasing the home bias of their sovereign portfolios. As already mentioned, this response would appear completely consistent with economic rationality and market equilibrium: in the event of euro breakup, the banks of each country would be better positioned to bear the brunt of redenomination of domestic sovereign debt in the new national currency, as their deposits would also be redenominated in the new currency. Insofar as redenomination risk gives them a “comparative advantage” in holding domestic debt relative to foreign banks, home bias in the euro-area sovereign debt market is an equilibrium phenomenon.

The only way to address this source of segmentation of euro-area sovereign bond markets – and more generally of euro-area debt markets – is to address the credibility of the EMU, as was done by Draghi with his well-known “whatever-it-takes” speech in July 2012 and with the subsequent inception of the Outright Monetary Transactions (OMT) program: by creating the credible threat that the ECB could buy the sovereign debt of distressed euro-area countries, the ECB reduced investors’ estimate of the probability of a possible euro breakup.

Nevertheless, the degree of segmentation of euro-area debt markets remains high: in each member country, domestic banks are still a key source of funding for both the domestic sovereign and the local private sector. Currently the home bias of euro-area banks is close to its peak in recent years: even though this has enabled banks in periphery countries to benefit from the drop in their domestic sovereign yields since mid-2012, it now leaves them more exposed to the risk of a rebound in these yields than they were at the breakout of the crisis in 2008. Right now, investors appear to consider a snapback in the risk premia on periphery sovereign debt as a low-probability event; yet, it might be more destabilizing than before – the typical features of tail risk. This risk is to some extent driven by changing political factors: the German government has recently expressed opposition to

future ECB sovereign bond-buying that is part of the OMT program;² the European elections of May 2014 have recorded decreasing popular support for EU institutions and in particular for the EMU; moreover, the fiscal imbalances of several euro-area countries are larger than they were during the financial crisis. At some point, these factors may revive investors' concerns about the survival of the euro, and lead sovereign yield differentials to spike again.

2. Bank forbearance, regulatory forbearance and bank resolution

Faced with a non-performing loan, a bank may exercise forbearance, that is, may agree to renegotiate and restructure the loan, for instance extending its maturity ("evergreening"). While this practice is perfectly justified when the bank's customer is facing a liquidity shock – and indeed is part of the insurance role that banks are supposed to play in their lending activity, it is not when the borrower is not solvent, and the forbearance reflects just the bank's attempt to avoid the recognition and allocation of losses that have occurred, and possibly to game its supervisors so as to avoid its own resolution. As noted in ESRB (2013), from a regulatory perspective the problem is whether these decisions by banks are distorted by risk-shifting incentives. In particular, banks may wish to delay the recognition of losses if their capital position is weak and loan collateral values are depressed, or if their stock prices are depressed, so that a recapitalization could only occur at unattractive terms.

Renegotiating loans with high-risk customers is effectively a gamble on the borrower's ability or willingness to repay. If the gamble does not pay off and the bank is eventually insolvent, some of the costs are borne by creditors and possibly by taxpayers, who will fund resolution of the bank. This gamble also wastes resources that could be more productively lent to more solid, new customers rather than to old, high-risk ones, and therefore tends to lower aggregate profitability and growth.

The problem is worsened if the forbearance of banks towards their borrowers is itself tolerated by supervisors, namely, if there is also forbearance of supervisors towards banks. In this case, there is not only moral hazard by banks but moral hazard by supervisors. The latter may engage in forbearance towards banks because they fear the fiscal consequences of cleaning up their balance

² On 21 March 2014, the German finance minister Wolfgang Schäuble stated that the ECB cannot decide on OMT bond purchases "because it has bound them to conditions that are beyond its control". Schäuble said that these conditions are decided by the ESM (the European Stability Mechanism bailout fund), which is controlled by governments, and "ESM decisions are subject to a unanimous vote and we will not approve of such a programme as announced by the ECB".

sheets and taking control of them. This can be a first-order determinant of systemic risk, because it raises the banks' incentives to engage in excessive forbearance, delays the recognition of their losses, and allows them to mount. To be effective, intervention must be swift and consist either of (i) recapitalization with effective imposition of control by the authorities to clean up the bank's books or (ii) resolution of the bank, to get rid of "zombie banks".

In the European context, the problem of forbearance can be complicated by cross-border externalities. Suppose that banks in country A exercise excessive forbearance towards their borrowers, and this is tolerated by their supervisors. If the banks in country A are heavily indebted with banks in country B, these are damaged by the lack of transparency about the true solvency position of banks in country A.

2.1. Regulatory forbearance and bank resolution: the European record

The European record before and during the crisis appears to feature a considerable degree of regulatory forbearance, especially when benchmarked with that of the US. National supervisors in the EU appear to have been far less inclined to shut down and liquidate distressed banks than the FDIC in the US, which has acquired a reputation for swift and efficient bank resolution. This transatlantic discrepancy is highlighted by Figure 3, which shows that far fewer EU banks have failed since 2008 compared with the number of banks that have been resolved by the FDIC in the US. A low propensity to resolve distressed institutions suggests a greater degree of regulatory forbearance by supervisors towards undercapitalised banks.

Most European responses to banks' difficulties in the crisis have been based on a desire to avoid intervention. Banks were given capital, loans and guarantees without any effective imposition of control by the authorities. Much capital was given in the form of hybrid securities, which are basically debt, except that they can absorb some losses under certain circumstances; this loss absorption capacity gave supervisors a rationale for treating these hybrids as equity even though in fact they are not. When capital was given in the form of equity, governments required seats on the banks' board but did not exert control to clean up their books.

European authorities have often preferred to rescue distressed banks by favoring acquisitions by (or mergers with) other domestic banks, rather than resolving them. During the financial crisis,

governments and supervisors facilitated several mergers or acquisitions involving distressed banks, despite concerns regarding excessive concentration and lack of competition. Between August 2008 and February 2014, the EU Commission received 440 requests from EU member states to provide state aid to financial institutions. The 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)).

Lambert, Ueda, Deb, Gray and Grippa (2014), who estimate the implicit government subsidy received by US, UK and euro area banks as a result of public implicit bailout guarantees, find that the size of this subsidy has declined somewhat from crisis peaks, but remains substantial, especially in the euro area. This is captured in Figure 4, which shows the average benefit (in terms of reduced funding costs) for banks in receipt of government support. Importantly, euro-area banks continue to benefit from a greater reduction in funding costs owing to government support than US or even UK banks. This reflects not only the weaker state of euro area banks' balance sheets, but also differences in the bank resolution frameworks. Moreover, Lambert et al. (2014) find that bank subsidies are more evenly distributed across banks in the euro area, whereas in the US they tend to be more selectively targeted at systemically important banks. This strong government support is likely to correlate also with greater risk-taking by banks: Marques, Correa and Sapriza (2013) find that the intensity of government support is positively related to measures of bank risk taking, especially in 2009-10.

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

1. In Europe, the ties between politics and banks are in some respects tighter than in the US. European governments have nurtured the growth of banks that could act as "national champions" in the competition with foreign banks – an attitude that Véron (2013) labels "banking nationalism". Véron points out that this tendency of European governments has ironically been enhanced by European financial integration: as the protection afforded by national boundaries diminished, politicians felt that they had to facilitate domestic banks' quest for size.
2. In the US, the legal and institutional tradition of bank resolution is long and strong: since its creation in 1934, the the Federal Deposit Insurance Corporation (FDIC) has resolved 4,063 banks, of which 3,471 have resulted in outright bank failures, and just 592 in FDIC-assisted mergers. The

law gives the FDIC full powers to intervene promptly, with a system of graduated responses depending on the severity of the solvency problem, and to take control if the situation seems to require it. The European institutional setup and track record in bank resolution is strikingly different, as shown by Figure 3: since 2008, around 50 euro-area banks have been resolved, compared with about 500 in the US (see Sapir and Wolff, 2013). The EU Directive on Bank Recovery and Resolution (and the Single Resolution Mechanism for euro-area banks) is expected to enter into force only in 2015 (see Section 2.2). The lack of such legal tools in the pre-crisis era may have contributed to the expectation that distressed banks would be bailed out, encouraging EU banks to indulge in excessive forbearance.

3. Banking supervision in parts of Europe has been less effective than in the US. Until 2014, bank supervision in Europe was a national concern, even though the span of European mega-banks' operations was international. This mismatch may partly explain the tendency to avoid resolution of distressed banks: so far, the EU lacked a procedure for integrated resolution of the parents and subsidiaries of banks with large cross-border operations by a single authority, capable of maintaining integrated operations of the corporate entity during resolution and avoiding harmful repercussions on the whole financial system. Moreover, as suggested by Shin (2012), the earlier and more comprehensive take-up of Basel 2 in the EU (compared to the US) allowed EU banks to expand more aggressively, given excessively low risk weights on securitisation activity and the procyclicality of the Basel 2 framework. In some countries, the sheer speed of banks' expansion may have outpaced national supervisors' ability to scale up their personnel and operations. For instance, in Iceland prior to 2007 financial supervision became inadequate to deal with the rapid expansion of domestic banks (see Benediktsdottir, Danielsson and Zoega, 2011).
4. In Europe, the universal banking business model is pervasive. Universal banks' securities trading arm can obtain funding at interest rates that reflect the public subsidies associated with their deposit-taking arm, increasing their 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 capitalized, and rely more on the wholesale market for funding, which are all typical features of universal banks.

2.2. Regulatory forbearance and bank resolution: the ongoing European reforms

The euro debt crisis has heightened European policy-makers' concerns about excessive forbearance by both banks and regulators, about the cross-border externalities that such forbearance may generate, and about the lack of an integrated resolution mechanism for distressed banks with extensive cross-border operations. The EU Commission and Parliament have attempted to address these problems with a drastic overhaul of both the system of bank prudential supervision and that of bank resolution, especially for systemically important banks.

In November 2013, the "Single Supervisory Mechanism (SSM) regulation" – conferring bank-supervisory powers on the ECB – entered into force. The SSM creates a new system of financial supervision comprising the ECB and the national competent authorities of participating EU countries. The centralization of bank supervision should help to eliminate or at least mitigate the risk of regulatory forbearance, by (i) setting homogeneous standards to monitor banks' forbearance throughout the euro area, and (ii) shifting the power over banks' loss recognition and resolution into the hands of an authority removed away from national concerns and political pressures.

In April 2014, the European Parliament adopted the Bank Recovery and Resolution Directive (BRRD). The Directive requires EU Member States to ensure that their national supervisory and resolution authorities have a minimum set of common tools and powers to avert and, where necessary, manage the orderly failure of a bank. It gives national resolution authorities powers to resolve branches of banks based in third countries in certain circumstances; and provides a framework for improved cooperation and coordination between national supervisory and resolution authorities. Moreover, the BRRD will enable (from 2016) authorities to "bail-in" the eligible liabilities (including unsecured creditors) of banks subject to resolution. Authorities will have powers to intervene ex ante in banks which are deemed irresolvable. This should help reduce the government subsidy given to EU banks, and therefore their incentive to indulge in excess forbearance ex ante.

In April 2014, the European Parliament also adopted a regulation establishing a Single Resolution Mechanism (SRM). The SRM implements the BRRD in the euro area, and therefore complements the SSM. A new EU body, the Single Resolution Board, will guide the resolution process for financial institutions in the euro area and in other EU countries signing up to it. The final decision on whether to resolve a bank will, however, be entrusted to the EU Commission, usually on the basis of a proposal

by the Board. As part of the SRM regulation, a Single Resolution Fund, financed ex ante by banks, will help to provide “bridge financing” for resolved banks – although this fund will not reach its target level of 1% of bank deposits (about €55tn) until 2023.

As pointed out by several scholars, this resolution mechanism suffers from three serious weaknesses. First, it entrusts the decision to shut down a bank to a collection of too many authorities: the ECB (as prudential regulator), the Board of the SRM (which comprises the Commission, the Council, the ECB and national resolution authorities), and the EU Commission itself, while it leaves the implementation of the resolution to national authorities. Second, the Single Resolution Fund is widely considered as too limited to support the resolution of systemically important financial institution (SIFI): “the Fund, as it is proposed today, will not be credible to support the resolution of a SIFI. The possibility to borrow on the capital market is insufficient, in particular since such loans will not be endorsed by governments, nor will the Fund be able to tap the European Stability Mechanism ESM” (p. 31, Gordon and Ringe, 2014). Thirdly, the EU resolution mechanism is not complemented by a centralized deposit insurance mechanism, unlike the FDIC in the US: hence, bank runs may occur in countries where banks are perceived as distressed, as depositors try to rescue their deposits by moving them to the banks of countries whose legal arrangements they trust more. This type of behavior may obviously interfere with the orderly resolution of a distressed bank.

These three flaws – the complexity of the resolution mechanism, the insufficient scale of its funding, and the absence of a centralized deposit insurance mechanism – may therefore hinder the prompt and orderly resolution of large, systemically important banks in the EU. This may in turn hurt the credibility of the Single Supervisor, as the lack of a credible resolution mechanism may force even the Single Supervisor to engage in forbearance in prudential supervision. If so, the euro-area tendency to excessive forbearance may eventually persist to some extent, despite these very extensive reforms.

3. Bank leverage and capital requirements

By their very nature, banks are highly levered institutions: most of what they lend is borrowed either from depositors, bondholders or the central bank. Such high leverage creates risk-shifting incentives for banks’ shareholders and managers, especially because a considerable fraction of their funding

comes from unsophisticated and dispersed depositors. This incentive is further enhanced by the opacity of banks' assets: for outside investors, it is hard to evaluate the riskiness of a bank's loan portfolio. Yet another source of risk-shifting arises from deposit insurance: intended to address the intrinsic fragility stemming from banks' maturity transformation, it effectively enables banks to unload also on taxpayers the losses arising from non-performing loans or security positions. On top of explicit deposit insurance schemes, systemically relevant banks can count on the government's implicit bail-out guarantee – an additional source of moral hazard, as already noted in Section 2.

The main counterweight to such risk-shifting incentives comes from the equity capital of banks, which plays a double role: *ex ante*, it reduces the risk-taking incentives of banks' shareholders, by ensuring that they have enough "skin in the game"; *ex post*, equity acts as a loss-absorbing buffer, being the first claim that is wiped out when losses arise, and thus gives protection to debtholders (including depositors) and taxpayers.

However, the equity capital requirements imposed by prudential regulation are often circumvented by banks, especially large ones, by exploiting loopholes in regulation. The behaviour of large European banks before the financial crisis is a good case in point. In the late 1990s, the largest 20 listed banks in the EU had a median "book leverage ratio" (defined as the book value of equity divided by the book value of total assets) of around 6% (Figure 5). By 2008, the median leverage ratio of these banks had dropped to just over 3%. All of the largest 20 listed EU banks reduced their leverage ratios before 2009. In the late 1990s, only a few of them had ratios below 4%; 10 years later, for most of them it was below this mark. Banks that in 2003 had ratios above 8% – such as HSBC and BBVA – had by 2008 reduced them by around half. The two banks that began the decade with ratios below 3% – Commerzbank and Dexia – finished the decade being bailed out by governments.

While the leverage ratios of banks fell between 2000 and 2007, their regulatory ratio – i.e. Tier 1 capital divided by risk-weighted assets – remained relatively stable. The median regulatory capital ratio was around 8% in each year between 1997 and 2007 – a period over which the median book equity-asset ratio fell by half (Figure 6). Hence, there was an increasing divergence between book and regulatory capital/asset ratios. These two measures, which were highly and positively correlated in the 1990s, became no longer correlated in the early 2000s for the largest banks. In fact, by 2012 the

correlation became negative and statistically significant: banks that were more capitalised according to the regulator had lower book equity relative to total assets!

Large banks managed to achieve this by acting both on the numerator (Tier 1 capital) and on the denominator (risk-weighted assets) of the regulatory capital ratio. On both sides, they engaged in massive regulatory arbitrage, made possible by the mistaken design of prudential regulation.

On the numerator's side, they replaced a considerable amount of equity capital with hybrid securities (such as conditional convertible bonds): these qualify as regulatory capital but have certain properties of debt, for example their cash flow is treated as interest and is thus tax deductible. Many banks issued hybrid capital as a cost-effective means of meeting their Tier 1 and Tier 2 capital requirements, although in the crisis many of these hybrid securities did not absorb losses as expected, as governments bailed out their holders alongside with depositors.³

On the denominator's side, banks managed to keep the growth of risk-weighted assets far below that of their total assets (hence exposing themselves to under-capitalized risks), in three ways:

- (i) Insofar as euro-area banks invested in euro-denominated sovereign debt, they did not add to their risk-weighted assets, as these securities carry a zero risk weight in the computation of risk-weighted assets (as explained in Section 1.3).
- (ii) Banks – especially large ones – exploited the latitude conferred to them by the Basel II treaty, by which they could devise their own internal risk models to determine the risk weights to be applied to their assets, based on the idea that this would make capital charges more sensitive to risk. But banks often tweaked (“optimized”) these models to systematically reduce the capital charges relative to those commensurate to the actual risks they were taking. Using German loan-level data, Behn, Haselmann and Vig (2014) find that the internal risk estimates produced for regulatory purposes systematically underpredict default rates, and that reliance on internal risk models allowed large banks to reduce their capital charges and thus expand their lending more than smaller banks that did not rely on internal risk models. Also Beltratti and Paladino (2013) document that banks exploited the latitude allowed by internal risk models, using an unbalanced

³ Boyson, Fahlenbrach and Stulz (2014) study trust preferred securities (TPS), a hybrid security issued by US bank holding companies since 1996 to replace equity in their Tier 1 capital. They document that US banks issued TPS mainly to maintain their Tier 1 capital ratios in periods of rapid growth, and argue that this regulatory arbitrage allowed banks to expand their leverage too much in the 2000s, leading to a deterioration in their performance during the financial crisis.

panel data set of 548 banks from 45 countries over the period 2005-11: banks with a higher cost of capital and better growth opportunities were more aggressive in reducing risk weights.

(iii) Banks used securitization to reduce regulatory capital, exploiting the lower risk weights that regulators attached to asset-backed securities than to the underlying loan pools: before the financial crisis of 2007-09, they increasingly relied on securitization methods that allowed them to retain risks on their balance sheets and yet achieve a reduction in regulatory capital, as documented by Acharya, Schnabl and Suarez (2013) for asset-backed commercial paper conduits.

Notably, these regulatory arbitrage activities were performed mostly by large banks, which were better equipped to engage in them than smaller ones: for instance, they had the technical expertise to develop and tweak internal risk models. Moreover, large banks had the greatest incentive to do so: given their scale, achieving even a small reduction in the leverage ratio without affecting their regulatory capital ratio would translate in a massive increase in assets, more than sufficient to cover the costs of the quants and lawyers required to plan and carry out the regulatory arbitrage. As a result, especially for large banks, the regulatory capital ratio has become less and less useful as an indicator of future distress probability (Danielsson, 2002). Figure 7 crystallises this notion: Tier 1 capital ratios in 2006 were uninformative about the respective banks' true default probabilities. Several large banks with high regulatory capital ratios in 2006 subsequently failed; conversely, several banks with low regulatory ratios in 2006 did not.

Recently, European banks have started to increase their regulatory capital ratios, but again this has been largely by reducing average risk-weights rather than by increasing their leverage ratio. Without risk-weighting, some EU banks remain thinly capitalised compared with international peers. As shown by Figure 8, the average leverage ratio of EU globally systemically important banks stood at 3.9% in the second quarter of 2013, versus 4.5% for US G-SIBs (using IFRS-equivalent accounting standards).

This highlights the importance of relying on a set of equity capital requirements that cannot be easily gamed, unlike what has apparently been the case so far. One possible solution would be to require banks to compute capital based on uniform risk weights set by regulators for each type of asset (the so-called "standardized approach"), rather than on their own internal models. Basel III has not adopted this solution, as it keeps relying on the ratio of Tier 1 capital to risk-weighted assets and on internal-risk models. But Basel III tries to correct the problem by its concomitant requirement of a

maximum book leverage ratio. Since no regulatory ratio is perfect, adopting multiple ratios does guard against the weaknesses of each while benefitting from the strengths of each, and helps to address the “regulatory arbitrage” by banks of a single choice of capital requirement: it helps identify banks that look healthy under one capital requirement but not under an alternative reasonable benchmark, such as the book leverage ratio.

Regulators would also benefit from comparing the rankings of capital shortfalls based on capital ratios with benchmark rankings of capital shortfalls arising from market-based assessment of the capital condition of the banks whose stocks are traded on sufficiently liquid markets. For such banks, the regulator could use as benchmarks (i) the market leverage ratio, i.e. the market value of equity divided by tangible assets minus derivative liabilities, and (ii) the stressed market leverage ratio, which accounts for the loss to market value of equity under stress, as for example in the SRISK measure produced by the NYU VLab. Prudential supervisors should monitor and investigate significant discrepancies between market-based and book-based measures of capital shortfalls, especially in the context of stress tests, as such discrepancies typically arise when investors suspect that asset valuations in banks’ books do not reflect the full extent of their losses.

4. Conclusions

This paper has highlighted serious flaws in three aspects of European financial regulation which contributed to the crisis that Europe has experienced in the 2009-12 period, and unless corrected will remain a source of persistent fragility of European banks. The EU legislators are aware of this, and have started a vast overhaul of bank supervision and resolution in the euro area (the epicentre of the crisis) – the “banking union” project. But also this vast regulatory overhaul suffers from some vulnerabilities, as noted in Section 2. In other key areas, the reform process is much further behind. As noted in Section 1, the current regulation of the sovereign exposures of banks is still a serious source of fragility of the euro-area banking system. Similarly, it is alarming that banks’ capital regulation keeps assigning a central importance to the ratio of Tier 1 Capital to risk-weighted assets, and keeps relying on banks’ internal-risk-based models, considering how susceptible to gaming these aspects of regulation have proved in the run-up to the crisis. Even the Asset Quality Review currently conducted by the ECB and the EBA in preparation of the 2014 stress tests still assigns a central role to

the ratio between Tier 1 Capital and risk-weighted assets, although it requires banks to disclose also their leverage ratio for information purposes only, i.e. without binding value or impact on the measurement of capital shortfalls (ECB, 2014).

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Figure 1. Two-year moving correlation between bank sector monthly stock returns and 10-year domestic sovereign debt returns (left axis, 2001-11) and domestic sovereign exposures of banks in the euro-area periphery (right axis, 2001-12)

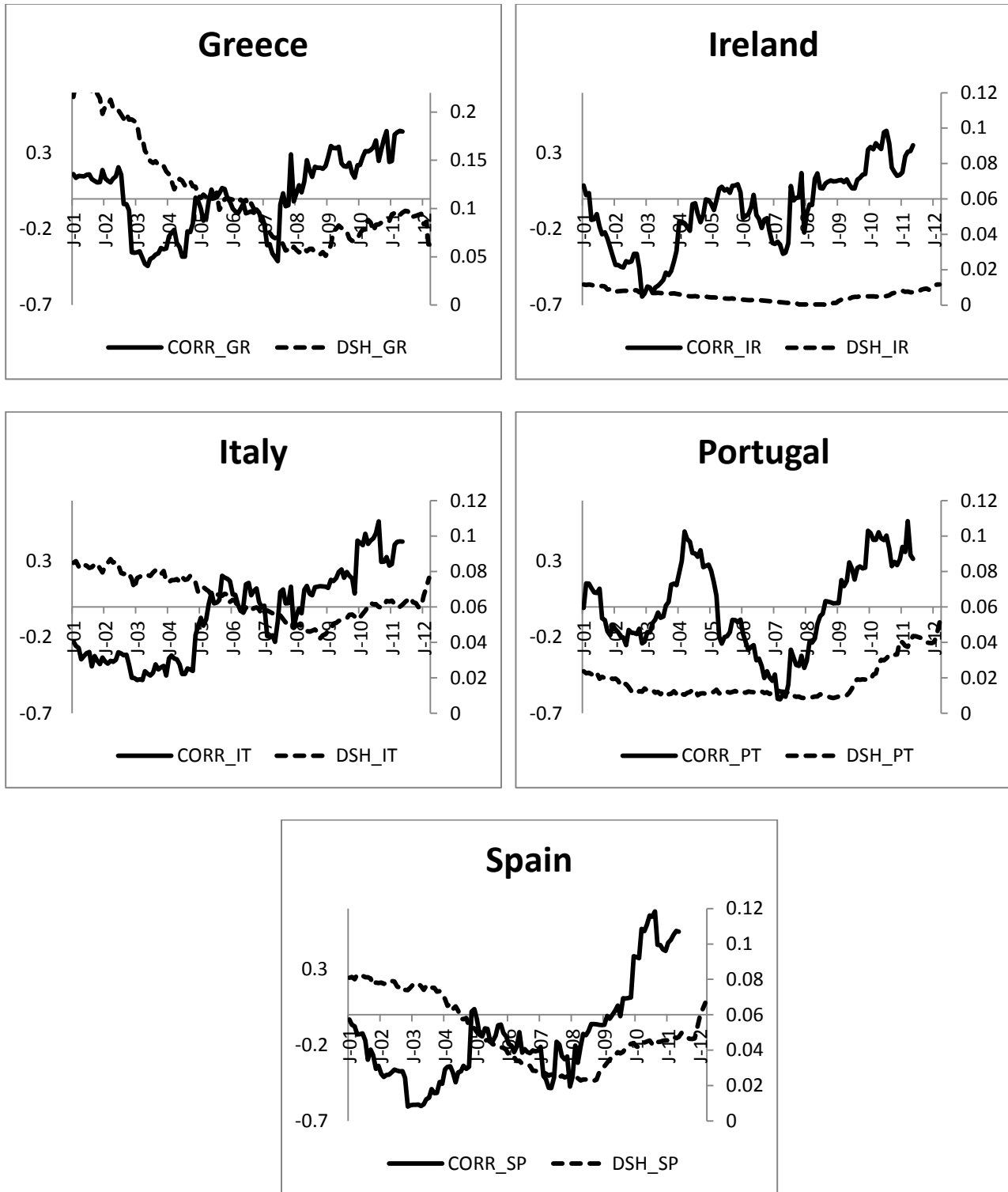


Figure 2. Two-year moving correlation between bank sector monthly stock returns and 10-year domestic sovereign debt returns (left axis, 2001-11) and domestic sovereign exposures of banks in the euro-area core (right axis, 2001-12)

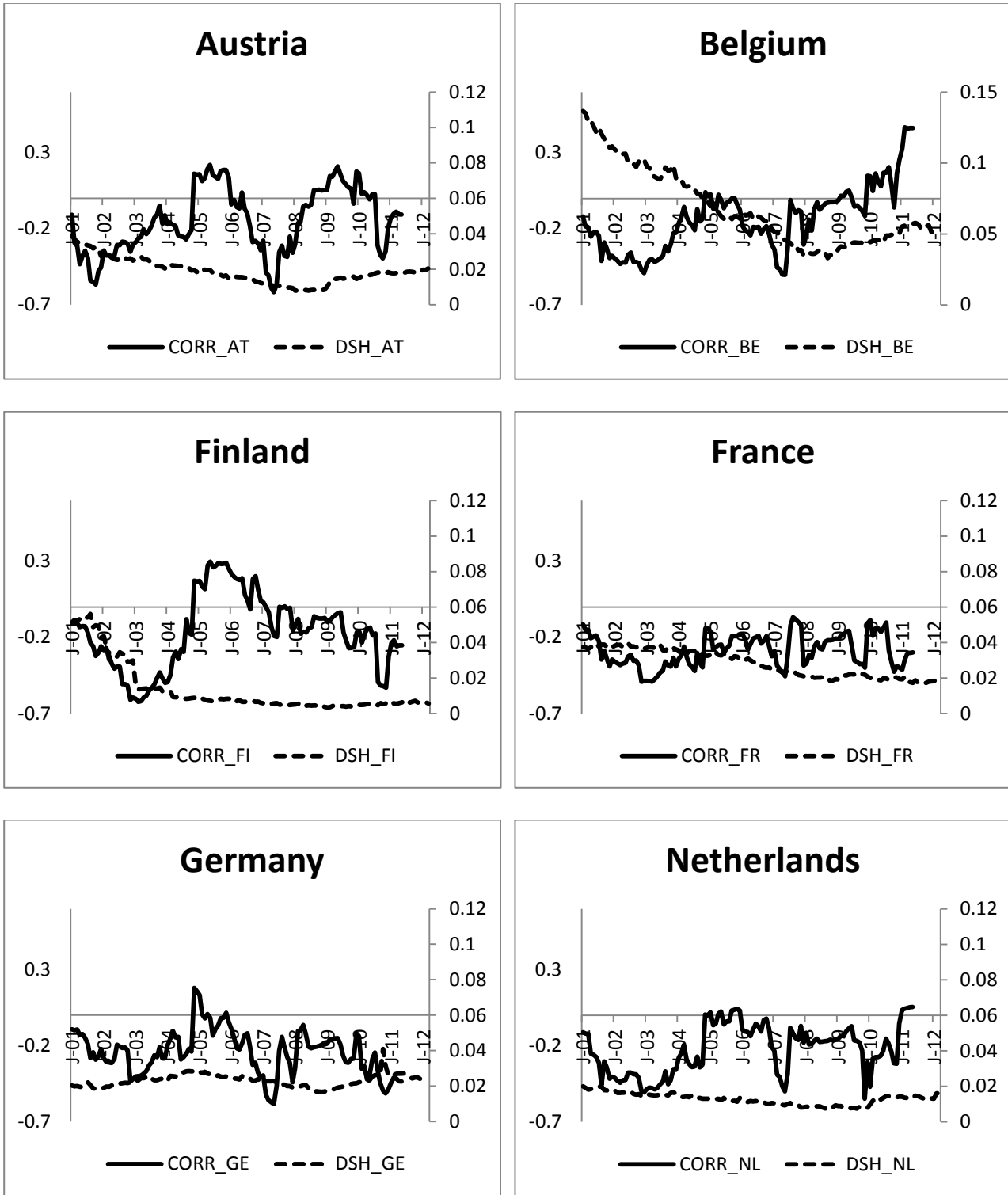
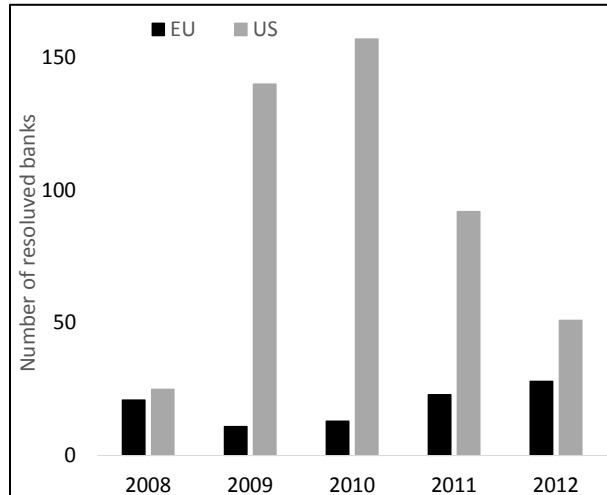
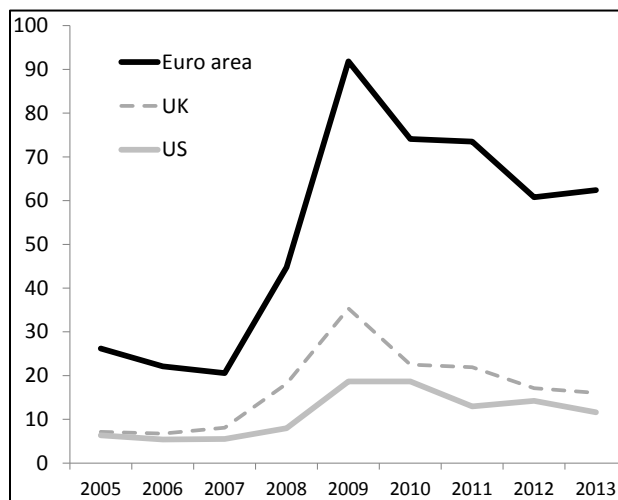


Figure 3. Bank resolution in the US and EU



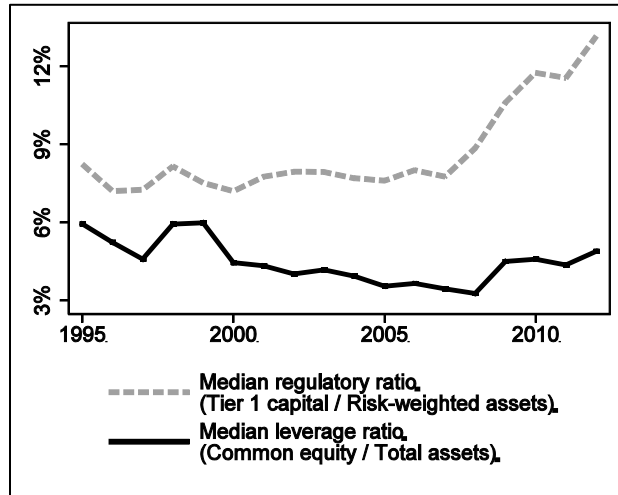
Source: FDIC and Open Economics. US data count the number of banks which failed and for which the FDIC was appointed receiver. EU data are from Open Economics, and count the total number of banks which failed (in a broad sense). EU data therefore include distressed mergers and part nationalisations;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

Figure 4. Average reduction in the funding costs of banks due to government guarantee (basis points)



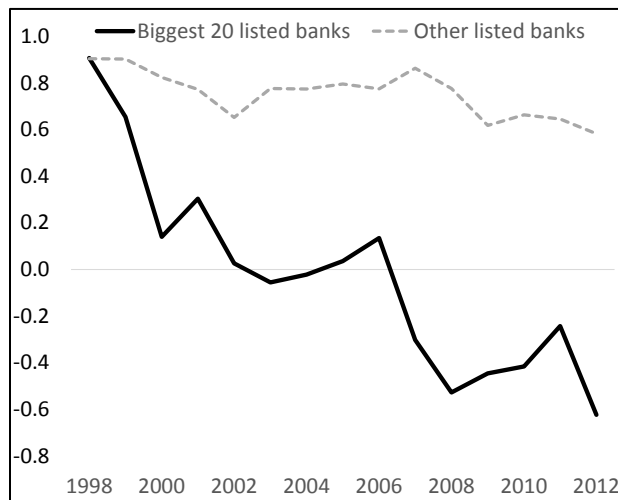
Source: data taken from Figure 3.10 in Lambert et al. (2014). The estimate of the reduction in funding costs owing to government guarantee is based on a ratings-based approach. The difference between issuer ratings and stand-alone (financial strength) ratings captures the rating uplift due to government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

Figure 5. Book leverage ratio versus regulatory capital ratio: median of top 20 EU banks



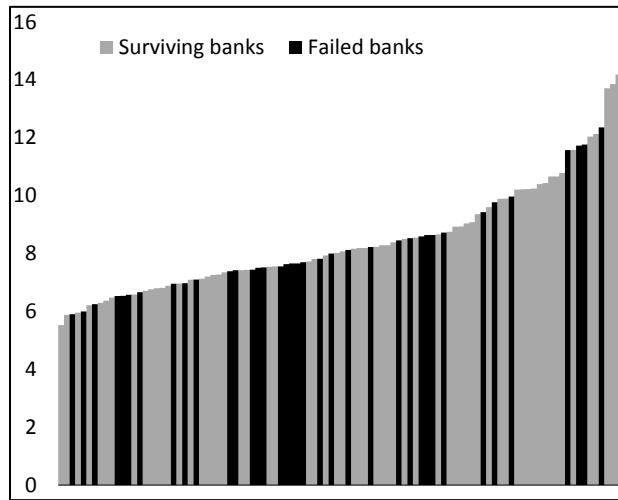
Source: Bloomberg. The plotted lines show the median regulatory ratio and median leverage ratio in a balanced sample of the largest 20 EU banks.

Figure 6. Correlation between the leverage ratio and the regulatory capital ratio for listed EU banks



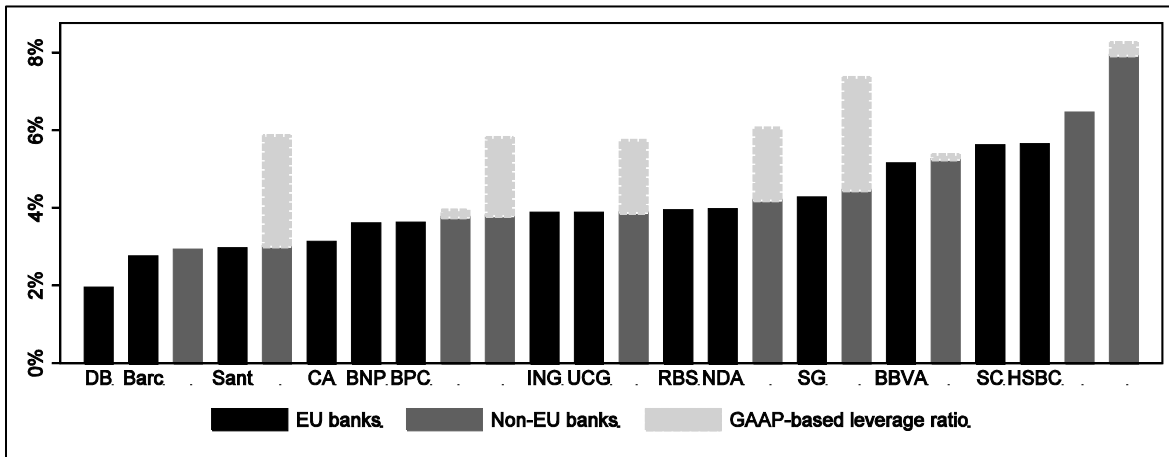
Source: Bloomberg.

Figure 7. Global banks' Tier-1 capital as percentage of risk-weighted assets in 2006



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

Figure 8. Global systemically important banks' leverage ratios in Q2-2013



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

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