Small Firms and Domestic Bank Dependence in Europe's Great Recession

Mathias Hoffmann (University of Zurich & CESifo)

Bent E. Sorensen (University of Houston & CEPR)*

May 11, 2015

Abstract

The paper examines the role of small businesses (SME) for the transmission of the crisis in the Eurozone and for risk sharing within and between countries. Our analysis draws attention to the role of domestic bank dependence—defined as the share of domestic credit originated by domestic banks—as a key variable that modulated the impact of shocks on bank-dependent SMEs and thus on the real economy. We argue that Eurozone banking integration in the years after the creation of the single currency was lopsided in the sense that, until 2008, cross-border lending between banks increased markedly while foreign banks' lending to the real sector stayed relatively flat. Hence, SMEs remained very dependent on domestic banks for credit, in spite of high levels of banking sector integration betwen Eurozone countries. Our results suggest that domestic bank dependence made countries, regions and sectors with many SMEs more vulnerable to global banking sector shocks and, at the same time, provided little risk sharing within the Eurozone.

KEYWORDS: SMALL AND MEDIUM ENTERPRISES, SME ACCESS TO FINANCE, BANKING INTEGRATION, DOMESTIC BANK DEPENDENCE, RISK SHARING, INTERNATIONAL TRANSMISSION
JEL-CODES: F30, F36, F40, F45

*Mathias Hoffmann is at the University of Zurich, Dept. of Economics, International Trade and Finance Group, Zürichbergstrasse 14, CH-8032 Zürich. He is also affiliated with University of Zurich's Research Priority Program in Financial Market Regulation (URPP FinReg), the CESifo Munich and the Centre for Applied Macroeconomic Analysis (CARMA) at the Australian National University. E-mail: mathias.hoffmann@uzh.ch.
Bent E. Sorensen is with the Department of Economics, University of Houston, Houston, TX, USA. He is also affiliated with the Centre for Economic Policy Research (CEPR). e-mail: besorensen@uh.edu

1 Introduction

Small and medium-sized businesses are typically locally or domestically owned and most do not have access to debt finance from outside their region or country, but rather depend on local provision of bank credit. If credit to the private sector is largely provided by domestic banks, we would expect SMEs to be particularly vulnerable to shocks to the domestic banking sector. Conversely, if credit is predominantly provided by the bond market or by foreign banks, countries, regions and sectors with a high share of SMEs should be less exposed to local shocks. This is what we show in this paper: during the financial crisis, European regions and sectors with many SMEs experienced deeper falls in output and the effects of a given output decline on consumption and income was bigger, i.e. there was less macroeconomic risk sharing. This empirical pattern was significantly worse in countries with higher levels of dependence on domestic bank finance.

SMEs are locally owned. Therefore, they are not able to share risk via the text-book risk sharing arrangement where cross-border ownership of productive assets allows firms and households in one country to claim the profits of firms in other countries. In general, broad-based, diversified ownership of assets across borders allows residents of a country to smooth their income in the face of idiosyncratic shocks at home. In addition, foreign ownership of domestic firms may stabilize output, employment, and consumption, for example by allowing foreign-owned firms to tap sources of finance from abroad when domestic credit markets dry up.

SMEs are also dependent on local provision of debt. Most SMEs are too small and too opaque to borrow from bond market directly or even to borrow from banks in other countries or regions. Our results show that—in the absence of diversified ownership—the diversification of debt finance matters. Specifically, integrated banks operating in several countries can operate internal capital markets which allows them to allocate loans to where the demand for these loans is highest. This enables local firms to obtain credit even if the national financial sector is in distress (and where, therefore, unsatisfied demand for loans is relatively high). Also, because integrated banks hold a portfolio of loans that is diversified across national boundaries, they are likely to be more willing to keep on lending to firms in a recession

2

country than would be purely national banks with their nationally concentrated portfolios. Our results are strongly supportive of this mechanism: high-SME regions and sectors did better, the less dependent on domestic banks a country's financial system was.

Our concept of domestic bank dependence is different from the conventional measures of banking sector integration. Since the inception of the Euro until 2008 cross-border bank lending in the Eurozone increased considerably, but much of it took place in the form of cross-border bank lending to banks. As we show, cross-border bank lending to the non-bank sector increased much less. To date it is still the exception rather than the rule that a Greek SME in Thessaloniki can actually borrow from the branch of a Dutch or German bank directly. The crisis has shown that 'bank-to-bank' integration is vulnerable to local shocks: as domestic banking sectors with their undiversified portfolios of domestic debt threatened to become insolvent, foreign bank lending to domestic banks dried up and local banks became unable to provide credit to the real sector. Hence, the dependence of the local economy on domestic banks amplified a major local banking sector shock, in spite of initially high levels of international banking integration. Our results suggest that a stronger dependence on diversified international banks would have helped to shield output, employment and consumption against local, idiosyncratic shocks.

The paper is structured as follows: Section 2 provides a first look at the data and some initial stylized facts. Section 3 places our analysis in the context of the literature while Section 4 uses a stylized theoretical framework to motivate our empirical specifications which allow us to study the transmission of the financial crisis across countries. Section 5 analyzes how domestic bank dependence has affected risk sharing between and within Eurozone countries and Section 6 offers conclusions.

2 A look at the data

It is commonly argued that the European Monetary Union has given a boost to banking integration in Europe. Figure 1 which is based on the BIS locational banking statistics, shows that this is indeed the case. The figure presents lending by foreign banks for a range of EMU countries. It is clear that these flows have exploded in the first decade of the EMU. However,

the figure also shows that most of this growth can be attributed to increased foreign bank lending to domestic banks. Foreign bank lending to the domestic non-bank sector (which here includes the domestic private sector and government) increased much less and has remained relatively flat. Interestingly, foreign lending to the non-bank sector generally also proved quite resilient during the financial and sovereign debt crisis, while bank-to-bank lending virtually imploded. The synchronization of the collapse in cross-border bank-to-bank lending is noteworthy in this context. Even though countries' post-2008 experiences varied hugely in terms of the severity of banking and sovereign crisis and in their real effects, the initial trigger (in terms of the US subprime crisis spilling over to Europe and leading to a worldwide crisis in interbanking markets) can be seen as a common factor that then had differential impact, depending on countries pre-existing vulnerabilities.

Figure 1 sets the scene for our empirical analysis. We argue that banking sector integration in Europe was lopsided in the sense that there was too little real banking integration that allowed the real sector to diversify its sources of finance away from domestic banks. Domestic real-sector lending continued to be financed by domestic banks which then refinanced themselves by borrowing from foreign banks. This led to the pattern we observe in the data, with the growth in cross-border lending driven by bank-to-bank lending.[1] We illustrate these two different concepts of banking integration in Figure 2. There are two countries, one referred to as core country, one as periphery country. The thick red arrow indicates the big cross-border banking flows in the data, whereas the thin grey arrows indicate the small flows of foreign bank lending to the respective other country's real sector. As was the case in the EMU before the crisis, net bank-to-bank flows were largely in the direction of the periphery country. The graph illustrates that, in the absence of direct cross-border real sector lending (thin or absent grey arrows) and in spite of possibly high levels of bank-to-bank integration (thick red arrows between the two countries' banking sectors), the periphery economy remains highly vulnerable to both international and domestics hocks. This for two reasons: first, domestic banks have a domestically concentrated asset portfolio which makes them vulnerable to any real-sector shocks in the home economy. Secondly, an

---

[1]Specifically, banks in the EMU periphery countries mainly borrowed from banks located in core economies which in turn refinanced themselves by borrowing in the US money market (Hale and Obstfeld (2014)).

international funding shock to banks in the periphery country will cut off bank credit supply to the domestic real sector.[2]

Figure 2 suggests that the impact of a domestic banking sector shock on the domestic economy will depend on the extent to which the real sector credit is provided by domestic banks. As a measure of domestic bank dependence in country k—abbreviated as DBD^k—we therefore propose the share of total real sector credit that is provided by domestic banks:

$$DBD^k = \frac{\text{Domestic Bank lending to the real private sector in country } k}{\text{Total credit to the real private sector in country } k}$$

The residual $1 - DBD^k$ then measures the extent to which real sector access to finance is diversified away from domestic banks. For convenience, we sometimes abbreviate this diversification measure as[3] $DAF^k = 1 - DBD^k$ (*Diversification of Access to Finance*).

We construct DBD^k using data from the Private Sector Credit Data base (PSCD) compiled by the Bank for International Settlements. This data base contains detailed information by country on the borrowing sector and the source of credit (domestic banks and foreign banks as well as debt securities). In the PSCD, the private sector comprises private non-financial corporations, households and non-profit institutions serving households. The data base rests on multiple data sources (national accounts, monetary surveys and the BIS banking statistics) and has some gaps in its country coverage, which generally limits our European sample in the remainder of the paper to 11 Eurozone countries (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, Spain) plus Denmark, Norway, Sweden and the UK. The data is quarterly and we obtain it for the period 1997Q1—2013Q4. Because our other data (that we describe in detail below) is at the annual level, we take fourth-quarter (end of-year) observations as annual values. We then obtain a time-invariant (pre-crisis) measure for DBD^k by taking pre-2008 averages for each country.

Because we construct DBD^k as a pre-crisis average, we can think of it as an *ex ante* mea-

---

[2]For example, this could be the case in a global banking crisis when cross-border bank lending—which is arguably much more short-term than cross-border bank-to-real sector lending—dries up.

[3]Note that a high degree of diversification of access to finance (i.e. low domestic bank dependence) may not only entail a high use of foreign bank lending. For example, DAF^k could be high if a country has a highly developed bond market, because the volume of outstanding debt securities is part of total real private sector credit. Hence, DAF^k could be high even if much of the debt issued in bond markets is held by domestic residents. Therefore, while clearly related to financial integration more generally, DAF^k is conceptually different in that it measures the exposure of an economy to shocks in its domestic banking sector.

sure of how exposed aggregate credit supply in a country is to domestic banking sector shocks. However, the real effects in terms of output, consumption or employment of any given drop in credit supply will also depend on how elastic the private sector is in its choice of financing source. For example, a big firm may choose to borrow from domestic banks in normal times but may quickly switch to the bond market when the domestic banking sector is in distress. Conversely, many small and medium-sized enterprises should be particularly vulnerable to domestic banking sector shocks because they are particularly bank dependent in the sense that they cannot easily turn to bond or equity markets to raise external finance. Figure 3 provides data from the 2011 edition of the European Central Bank's and EU commission's survey of access to finance by enterprises (SAFE) on sources of external finance of SMEs (defined as firms with with fewer than 250 employees). The figure illustrates that bank loans are by far the most important source of external finance for SMEs in most countries.

We would therefore expect that domestic bank dependence affected SMEs particularly strongly during the crisis. Figure 4 provides prima facie evidence that this is the case. The first panel plots the share of SMEs that reported problems with obtaining external finance against our access-diversification measure DAF^k. The second panel plots the share of firms reporting increased interest expenses minus the share of firms reporting decreased expenses against DAF^k. Both plots deliver the same message: in countries with high levels of domestic bank dependence, the impact of the crisis on the financial situation of SMEs was worse.

In the remainder of the paper, we examine in more detail the conjectures put forward in this section. First, we will estimate how cross-country variation in domestic bank dependence interacted with cross-country and cross-sectoral variation in SME shares in the international transmission of the common shock presented by the financial crisis. In a second step, we will ask how domestic bank dependence and SME importance affected the ability of economies to deal with asymmetric shocks and to share risk with other countries or regions.

3   Related literature

Our analysis draws on several strands of the empirical literature. The first strand concerns the role of banking integration in the transmission of macroeconomic shocks. The second

6

strand encompasses recent empirical work that has emphasized the particular financing constraints faced by small firms during the European financial and sovereign debt crisis. The third strand is the body of empirical research on international and intranational risk sharing.

Regarding the literature on the international transmission of bankings sector shocks, we build on Peek and Rosengren (1997) and Peek and Rosengren (2000) who studied the impact of the burst of Japan's property bubble in the 1990s on the lending of Japanese banks in the US. Imai and Takarabe (2011) use a similar approach to study how the same shock spread throughout Japan's prefectures. Our paper is also related to recent work by Cetorelli and Goldberg (2012*a*,*b*) in its emphasis on the role of global banks' internal capital markets in international transmission and to Kalemli-Ozcan, Papaioannou and Perri (2013) who show that the impact of banking integration on business cycle synchronization differs between crisis and tranquil periods.

Recent papers that have recognized the role of the particular financing constraints faced by SMEs during the Eurozone crisis include Ferrando and Mulier (2013) and Ferrando, Popov and Udell (2015). Ferrando and Mulier (2013) match SMEs' survey responses to balance sheet information to check whether reported financial constraints line up with balance sheet facts. Our analysis is also close to Ferrando, Popov and Udell (2015) who use firm-level data to document that SMEs financing constrained are exacerbated in countries which were under macroeconomic and sovereign risk 'stress' during the financial crisis.

Different from the studies discussed so far, our analysis of international transmission focuses on the interaction of SME prevalence and the lopsided nature of banking integration in the Eurozone with its focus of bank-to-bank integration—that we argue exacerbated domestic bank dependence—as a key factor in the transmission of the crisis across countries, regions and sectors. The empirical and theoretical framework for our analysis heavily draws on earlier work by one of us (Hoffmann and Okubo (2013, 2015)) who find that similar mechanisms to the ones we document for Europe in our analysis here were at work during Japan's lost decade. Our emphasis of the differential impact of international and domestic bank lending on sector-level growth outcomes during the Eurozone crisis closely connects our work to Schnabel and Seckinger (2015). While Schnabel and Seckinger (2015) focus on external finance dependence in the sense of Rajan and Zingales (1998) as a source of firm-

level financial constraints, we draw attention to firm size and the particular dependence of small firms on the local provision of credit as a key friction. Our paper also relates closely to recent work at the IMF (International Monetary Fund (IMF)) that emphasizes the different impacts that cross-border and direct local lending by foreign banks have on financial stability. We add to this by focussing on how international lending has affected real outcomes (output and income) during the crisis in the Eurozone and by highlighting that it is important to distinguish between international bank-to-bank and bank-to-real sector lending in this context.

The second part of our paper builds on the body of empirical work on risk sharing within and between countries (Asdrubali, Sørensen and Yosha (1996), Sorensen and Yosha (1998), Becker and Hoffmann (2006)). This literature has generally found that risk sharing between countries is much better than within them. Financial integration since the 1990s has improved risk sharing at the international level (Sørensen et al. (2007)), at least among industrialized countries (Artis and Hoffmann (2011), Kose, Prasad and Terrones (2009)) and in particular among Eurozone economies. However, much of this improvement in risk sharing took place through channels that did not prove resilient to stress during the recent crisis: in long-established monetary and banking unions, such as the United States, capital income flows derived from cross-border ownership of assets constitute the main channel through which the impact of asymmetric business cycle shocks is cushioned (Asdrubali, Sørensen and Yosha (1996)), while at the international level, risk sharing seems to happen largely through flows of non-contingent credit (Sorensen and Yosha (1998), Becker and Hoffmann (2006)).

Our own previous work has shown that banking integration in the U.S. following state-level deregulation has successfully contributed to improved risk sharing between federal states (Demyanyk, Ostergaard and Sørensen (2007)) and that this improvement came about mainly through better access to finance for small and medium-sized firms, in particular during U.S.-wide recessions (Hoffmann and Shcherbakova-Stewen (2011)). These findings suggest that the "right" form of banking-integration can help share risks better, even in the depth of a global crisis or major recession. In this paper, we provide evidence that similar channels were at work during the financial crisis in the Eurozone: bank-to-real sector

integration—to the extent that it had actually happened—eventually did contribute to better risk sharing between and within countries, in particular if local economies had many SMEs. However, much of the increase in banking-sector integration in Europe in the years before the crisis proved fragile because it was exclusively among banks. This form of integration fully exposed economies to shocks to their local banking sectors, which in the absence of any meaningful cross-border ownership of capital left them without any viable mechanism for sharing risks internationally.

4 Domestic bank dependence and the transmission of the financial crisis across the Eurozone

Some theoretical considerations

To structure our discussion of how cross-country differences in the prevalence of SMEs interacted with domestic bank dependence in the transmission of the financial crisis, we use a stylized theoretical model adapted from Hoffmann and Okubo (2015) that, in turn, builds on Morgan, Rime and Strahan (2004).

The model assumes that there are two countries or regions which differ in terms of the importance of SMEs for the local economy. In the high-SME country, loan demand of the real sector is assumed to be less elastic than in the low-SME country. This assumption captures the idea that SMEs are dependent on the local provision of bank finance, i.e. they cannot easily borrow from banks in other countries or from the capital market.

In Figure5, we contrast the impact of a Europe-wide banking sector shock under high and low domestic bank dependence. In the high domestic dependence scenario, domestic banks are the only providers of credit to local SMEs. In the scenario of low domestic bank dependence, foreign banks can lend directly to SMEs, thus equalizing private-sector borrowing rates across the two countries. This notion of domestic bank dependence implies that financial integration is limited in two very specific ways: first, parts of the real sector (specifically SMEs) cannot easily access non-local finance. Second, banks cannot directly lend to the real sector in other countries. However, domestic bank dependence does not preclude that banks

lend to each other or that larger firms have access to integrated bond markets=–as was clearly the case in the EMU, at least before 2008.

In both the low and the high domestic bank dependence scenarios, the initial (pre-crisis) local loan supply is assumed to be given by the loan supply curve L_0 in both countries / regions. We then consider the case of a banking sector shock that affects local banks in both regions equally, shifting the local loan supply curves inwards by ΔL for any given interest rate, as indicated by the red, dashed supply curves. As we can see from the dashed supply curves, under domestic bank dependence, the same negative credit supply shock will lead to higher increases in interest rates in the high-SME country than in the low-SME country because of the lower loan demand elasticity of the real sector. Because foreign banks cannot directly lend to the private sector, differentials in real sector borrowing rates will not be arbitraged away. When domestic bank dependence is low, however, there will be a tendency for real sector borrowing rates to equalize across regions (green, solid supply curves). Because banks can now intermediate loans across country borders loan supply in the low-SME region will contract further (relative to the high local bank dependence case) while supply will expand in the high SME region, until the interest rate on the marginal real sector loan is equalized in both countries.

Empirical specifications

We motivate our empirical specifications from a direct comparison of the high- and low domestic bank dependence scenarios in Figure 5: in the high-SME country, lending will drop (and interst rates rise) less if domestic bank dependence is low. This is because under low domestic bank dependence, the high willingness of SMEs to pay when local banks stop lending will prompt foreign banks to shift lending to the high-SME country. To the extent that SMEs' output and employment are particularly sensitive to fluctuations in lending and in interest rates, we therefore expect that the negative impact of a lending-supply shock on SMEs would be attenuated in regions with low domestic bank dependence. We exploit this key prediction of the stylized model in our empirical implementation.[4] Our baseline

---

[4]It is also true that lending drops more in the low-SME region when domestic bank dependence is high. However, our assumption is that SMEs (in terms of output or employment) are overall more sensitive to fluctuations in bank lending than bigger firms. Recall that the reason why we assumed that bigger firms' demand functions

regression is

$$\Delta \log \text{GDP}_t^k = \text{CRISIS}_t \times \left[\alpha_1 \text{SME}^k + \alpha_2 (1 - \text{DBD}^k) + \alpha_3 (1 - \text{DBD})^k \times {}^k \right] + \text{CONTROLS} + \varepsilon_t^k$$

where $\Delta \log \text{GDP}_t^k$ is the growth rate of output in country k and year t. The abbreviation SME stands for the share of SMEs with less than 250 employees in country k GDP in 2008 and DBD is our measure of domestic bank dependence, the share of domestic banks in total private sector credit. The difference $1 - \text{DBD}$ therefore measures of how diversified (i.e. independent from domestic banks) real sector access to finance is in a country. The variable CRISIS_t indicates the crisis period after 2008 and does not vary by country. Note that the regression does not include stand-alone terms for the crisis indicator or our time-invariant measures SME and DBD. These terms are absorbed by the time and country-fixed effects that we include in our set of controls.

The maintained assumption in the above specification is that the financial crisis was a major credit supply shock that, in principle, was common to all E(M)U countries but that affected countries differently according to their specific vulnerabilities: the share of SMEs and the extent to which these SMEs dependend on domestic banks for finance. Our main interest is in the coefficient α_1 on the triple interaction between SME, $1 - \text{DBD}$ and the crisis indicator. The stylized model would predict that this coefficient is positive: during the crisis, growth in countries with many SMEs particularly benefited from diversified access to finance, i.e. from low levels of domestic bank dependence.

Since the number of countries in our sample is necessarily limited, we also estimate a version of the above equation

$$\Delta \log \text{GDP}_t^i = \text{CRISIS}_t \times \left[\alpha_1 \text{SME}^{k(i)} + \alpha_2 (1 - \text{DBD}^{k(i)}) + \alpha_3 (1 - \text{DBD}^{k(i)}) \times \text{SME}^{ki} \right] + \text{CONTROLS} + \varepsilon_t^i$$

in which output growth now varies across regions (indexed by i). We call this the region-level specification and we will estimate it using NUTS2-level data. Note that in the region-level specification local bank dependence and SME continue to be measured at the country-level,

are more elastic in the first place was that bigger firms have easier access to capital markets. Hence, a drop in bank lending to bigger firms per se does not mean that their output drops because much of this lending may be substituted from other sources.

with $k(i)$ indexing the country to which region i belongs. Unfortunately, we do not have data on how diversified access to finance for the real sector is at the regional level nor do we have access to data on SME importance at the regional level. Still, the bigger number of cross-sectional observations for output allows us to identify the country-specific impact of the crisis with larger precision (e.g. by allowing us to control for region-effects.

To the extent that SMEs benefitted from diversified access to finance during the crisis, we would also expect to see sectoral differences in output growth to be affected by the interaction of sector-level SME importance and domestic bank dependence. We therefore also estimate a third, sector-level specification of the baseline regression

$$\Delta \log \text{GDP}_t^{k,s} = \text{CRISIS}_t \times \left[\alpha_1 \text{SME}^{k,s} + \alpha_2 (1 - \text{DBD}^k) + \alpha_3 (1 - \text{DBD}^k) \times \text{SME}^{k,s} \right] + \text{CONTROLS} + \varepsilon_t^{k,s}$$

in which SME shares and output growth now vary by both country and sector. As before, domestic bank dependence is measured at the country-level.

Data

To implement the above regressions, we measure output growth using annual data on gross value added at the sectoral level and GDP at the NUTS2- and national levels from Eurostat. We obtain real per capita values by deflating with the respective national harmonized index of consumer prices (HICP) and using population data form the same source.

While DBD is constructed in the way already described in section 2, our data on SME importance is from the 2014 issue of the annual data base accompanying the European Commissions' SME performance review.[5] Specifically, we construct our measure SME as the employment share at the national or country-sector level of firms with fewer than 250 employees. While the values for DBD^k are constructed as pre-2008, within-country averages, data on the emplyoment shares of small businesses are a not generally available before 2008. We therefore use the 2008 values to construct SME^k.

---

[5]http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/performance-review/index_en.htm

Baseline results

The results of these three baseline specifications are summarized in Table 6. Consistent with our theoretical interpretation, our main coefficient of interest, α_1, is positive in all three cases. This suggests that diversified access to finance was particularly important for countries, regions or sectors with many SMEs. Note that the stand-alone terms of SME and $(1 - DBD)$ are not generally significant in the first two specifications. Given that, in all our specifications, SME and $1 - DBD$ are cross-sectionally demeaned, this suggests that for the average country or region an increase (decrease) in the SME share or in diversified access to finance does not unambiguously lead to higher or lower growth. Consistent with the stylized model, the interaction between the local dependence on credit and diversified access to credit is a major factor in the cross-country, cross-regional and cross-sector heterogeneity in post-crisis GDP growth. The effect is quantitatively important: the standard deviaton of SME shares across countries is 0.06 The cross-country standard deviation of $1 - DBD$ is 0.13. Hence, based on an estimate of α_1 of around 3 (as we find in the country- and NUTS-level regressions in columns 1 and 2), a country with an SME share one standard deviation above the mean will have grown by 2.5 percent per year more (less) than the European average if diversification of bank finance is one standard deviation above (below) the EMU average. Even though the estimate of $\alpha_1 = 0.7$ in the sector-country regression is lower (note that this regression controls for country- and sector effects), the effect is still sizable. The standard-deviation of SME shares across country-sectors, which is around 0.15, implies that a country-sector from a country with access to finance one standard deviation above (below) the mean would have increased (decreased) annual post-crisis GDP growth in that sector by 1.4 percent per year.

Robustness

In Table 6, we examine to what extent our results depend on the inclusion of different countries into the sample. Specifically, we augment the respective baseline specification to include a dummy for the EMU core economies (Belgium, France, Germany and the Netherlands) or a dummy for Greece in the interactions with the crisis indicator. In all specifications, the coefficient α_1 stays positive and in alls specifications with the core dummy also very close to

the baseline estimates in 6 and significant in four of the six specifications. There is some evidence of instability in the coefficient α_1 in the specifications that explicitly control for Greece, though it remains significant in both the country-level and in the country-sector regressions.

In our country- and regional-level regressions, identification necessarily depends on just a few observations, since both SME and $1 - DBD$ vary only by country. We therefore focus on variations of the country-sector level regressions in Table 6. In the first two columns, we include, in turn, country-time and sector-time effects, in addition to the country-sector and time effects that were already included in the previous specifications. Our estimate of α_1 stays positive in both specifications remain significant at the 10 percent level when sector-time effects are included. It is, however, insignificant if we allow for country-time effects. This may not be too surprising, however given that our measure of local bank dependence varies only by country. If—as our model would imply—lending to SMEs declines more (and SME borrowing rates increase more) in countries with higher domestic bank dependence, then this effect would be absorbed by the country-time effect and our triple-interaction should become insignificant once these effects are controlled for—exactly as we observe here. Finally, the Table shows that our findings hold up even in the cross-section: the last column of Table 6 presents a cross-sectional regression of the post-2008 drop in sectoral GDP growth on 2008 SME shares and the interaction of SMEs with a dummy that indicates if local bank dependence is high or low in a country. Again our results hold up.[6]

Figure (6) visualizes the results from the cross-sectional regression regression and highlights the importance of the interaction between diversified access to finance and SME importance. The figure plots the post-2008 averages of country-sector GDP growth rates against the 2008 SME shares. Across the whole sample, the link between growth and SME shares seems weak at best. However, once we distinguish between country-sectors in countries with above-median (blue diamonds) and below-median (red dots) levels of diversification of access to finance, we find that there is a strong negative link between growth and SME shares in country-sectors with strong domestic bank dependence. This negative link is not

---

[6]As pointed out by Bertrand, Duflo and Mullainathan (2004), panel diff-in-diff regressions such as our baseline specifications can be spuriously significant if there is essentially only one common treatment (in our case: the crisis). They therefore recommend a "before-after" cross-sectional regression such as the one presented here as a robustness check.

present in sectors located in countries with diversified access to finance.

5 Domestic bank dependence and risk sharing between and within Eurozone countries

In the benchmark model of risk sharing, see for instance Mace (1991), consumption growth is identical for all agents. This outcome is optimal under a set of stringent assumptions, which are not likely to hold literally, but if income is highly diversified, income—and therefore consumption—may be close to this ideal situation. In this paper, we use the equal growth condition as the definition of perfect risk sharing and we measure the extent of deviation from identical income growth rates. Asdrubali, Sørensen and Yosha (1996) develop a framework for decomposing shocks to GDP into the fraction insured via private cross ownership of assets (the "market channel"), a fraction insured via the federal system, and the share of GDP shocks absorbed in counter-cyclical saving. The main channels of risk sharing between U.S. states is cross ownership of assets, while Sorensen and Yosha (1998) find that mainly counter cyclical public saving smoothes consumption between EU countries. Our focus is on the market channel. Small businesses often do not have access to foreign equity or bank lending and we examine if this is reflected in the amount of market risk sharing (which we will also refer to as "income smoothing") and whether income smoothing is affected by domestic bank dependence in particular in regions with many small businesses.

In this paper, we focus on Net National Disposable Income (NNDI) at the country level and disposable income of private households at the NUTS2 level, although we refer to either as "NNDI"). We think of GDP as exogenous, even if this assumption isn't crucial for our accounting. Then income is GDP plus "net dividends." In simple theoretical models, "dividends" may be dividends on corporate equity, but measured net dividends are small and the difference between GDP and net national disposable income comprises a host of elements. Retained earnings is a large component of which funds retained to replace depreciated machinery is a large, if not so interesting, component (note that GDP is gross of depreciation while net income is net of appreciation). Corporate savings contribute to risk sharing at the annual frequency but not much at longer frequencies (Sorensen and Yosha (1998)). Workers

can be seen as implicit share holders, because firms smooth wages over time and across sub-sidiaries (BuddKoningsSlaughterREStat2005), and while the macro impact such channels of income smoothing are not well measured, they are likely large at shorter frequencies. Of more interest here is that risky loans resemble equity, having state-contingent pay-offs. If the borrower does well the lender receives interest rate payments in excess of the safe rate and if the borrower default the lender receives only a fraction of the nominal value of the loan. This is likely to be particularly relevant for bank loans to small firms which do not have access to equity markets or corporate bonds and who are not able to smooth salaries across several subsidiaries. Demyanyk, Ostergaard and Sørensen (2007) argues that this is likely to be an important source of income smoothing for small business owners and find, using the same metric as we apply here, that income smoothing between U.S. states increased significantly after bank deregulation allowed for mergers across state borders and that this effect was stronger in states with relatively many small firms. Private household disposable income further includes net cash transfers from the government—we do not focus on government transfers in the article, because or focus is on SMEs and domestic bank dependence, but our NUTS2 results reflect the impact of these variables after any government transfers.

Risk sharing is of economic importance. If, say, a country has perfect income smoothing within its borders, regional differences in economic growth are less problematic while, if regions with sub-par economic growth are the same regions with low income smoothing, regional disparities are more problematic. Our risk sharing results further are informative about capital market integration in the broad sense. Everything else equal, the amount of risk sharing is proportional to the, direct or indirect, ownership share of "owners" outside the "risk sharing group" (in this paper, meaning the country or the NUTS2 region). In reality, the everything-equal clause will not hold for a host of reasons, in particular, the type of shocks hitting each region may be different, but if risk sharing on average declines with the preponderance of SMEs, and declines with domestic banking dependence—as we find to be the case—this indicates that SMEs indeed have less access to outside risk capital, especially when domestic bank dependence is high.

Our empirical strategy is simple. Our measure of risk sharing is based on how closely income growth tracks output growth. More precisely, in order to measure income smoothing

between countries, we run the basic regression

$$\Delta \log \text{GDP}_{ct} - \Delta \log \text{NNDI}_{ct} = \mu_t + \nu_c + \beta \, \Delta \log \text{GDP}_{ct} + u_{ct} \,,$$

where NNDI is (real, per capita) Net National Disposable Income, the supersript c refers to countries, and t to year, while μ_t indicates time fixed effects (a dummy variable for each year) and ν_c indicates country fixed effects (a dummy variable for each country). The object of interest is the coefficient β which measures the amount of income smoothing. For example, if NNDI-growth is not correlated with GDP-growth at all, the regression becomes equivalent to a regression of $\Delta \log \text{GDP}$ on $\Delta \log \text{GDP}$ and we get an estimated value of unity, which we interpret as 100 percent income smoothing. If NNDI-growth is perfectly correlated with GDP-growth, the left-hand side of the equation becomes zero, which we interpret as 0 percent income smoothing. We expect to find values between 0 and 1, but we do not restrict the coefficient take values in that interval. The inclusion of the time fixed is crucial for the risk sharing interpretation because the time dummies control for the uninsurable aggregate component of GDP. Including a country dummy is not essential, but it controls for constant country-specific differences in $\Delta \log \text{GDP}$ and $\Delta \log \text{NNDI}$.[7] Using $\Delta \log \text{GDP}$ minus $\Delta \log \text{NNDI}$ on left-hand side of the equation allows us to directly interpret the coefficient as the fraction of risk shared (see Asdrubali, Sørensen and Yosha (1996)).

If one were to linearize the measure of risk sharing (using $(\log(1 + x) \approx x)$, it would boil down to a regression of "dividends" on GDP. In such a regression, constant dividends would produce a β coefficient of 0, but we think that a metric for risk sharing should assign a positive value to, say, constant payments from the government. Our metric would capture this because $\log(\text{GDP}) - \log(\text{GDP} + \text{"}netdividends\text{"})$ is a positive number when "net dividends" are positive. This reflects that the logarithmic function has the concave shape of a utility function. If "net dividends" vary counter-cyclically, both a linear and the logarithmic specification would measure income smoothing.

---

[7]The results are virtually unchanged if the country dummy is dropped

In order to measure the impact of SMEs on risk sharing, we estimate the relation

$$\Delta \log \text{GDP}_{ct} - \Delta \log \text{NNDI}_{ct} \; = \; \mu_t + \nu_c + \beta \, \Delta \log \text{GDP}_{ct}$$
$$+ \; \gamma \, \overline{\Delta \log \text{GDP}}_{ct} * \overline{\text{SME}_{c.}} + u_{ct} \, ,$$

where $\overline{\Delta \log \text{GDP}}_{ct} = \Delta \log \text{GDP}_{ct} - \Delta \log \text{GDP}_{.t} - \Delta \log \text{GDP}_{c.}$. Superscripts of the form $c.$ indicates that averages has been taken over the "left-out index" so that, for instance, $\text{SME}_{c.}$ is the average over time for each country. Double dots indicates the overall mean and superscript $.t$ indicates that the average over all countries has been taken for each period t. The logic of the regression is to measure how the left-hand side varies with country-specific growth in GDP, and the inclusion of the time fixed effect technically implies that we are measuring the impact on Net Disposable Income of $\Delta \log \text{GDP}_{ct} - \Delta \log \text{GDP}_{.t}$.[8] Ignoring the less important country dummies, we want to measure the impact of the prevalence of small firms in a country; i.e., we allow the impact of GDP on income smoothed to vary with the relative share of SMEs, such that

$$\frac{\partial \left(\text{GDP}_{ct} - \text{NNDI}_{ct} \right)}{\partial \text{GDP}_{ct}} = \beta + \gamma \text{SME}_{c.} \, .$$

The estimation equation above, has the interpretation of allowing the risk sharing coefficient to change in that manner. We further subtract averages in order to leave the interpretation of β unchanged as the amount of risk sharing for a country with an average level of SME. (See Ozer-Balli and Sørensen (2013)) for a detailed explanation of this issue.)

Further, we want to explore whether domestic bank dependence, DBD, affect risk sharing. For that purpose, we estimate the relation

$$\Delta \log \text{GDP}_{ct} - \Delta \log \text{NNDI}_{ct} = \mu_t + \nu_c + \beta \, \Delta \log \text{GDP}_{ct}$$
$$+ \gamma \, \overline{\Delta \log \text{GDP}}_{ct} * \left(\text{SME}_{c.} - \text{SME}_{..} \right) + \delta \, \overline{\Delta \log \text{GDP}}_{ct} * \left(-\text{DBD}_{c2008} + \text{DBD}_{..} \right)$$
$$+ \kappa \, \overline{\Delta \log \text{GDP}}_{ct} * \left(-\text{DBD}_{c2008} + \text{DBD}_{..} \right) * \left(\text{SME}_{c.} - \text{SME}_{..} \right) + u_{ct} \, .$$

In this regression, we allow the impact of DBD on income smoothed to vary with the

---

[8]Technically, this follows from the Frisch-Waugh theorem. The three regressions i) $\Delta \log \text{GDP}_{ct} - \Delta \log \text{NNDI}_{ct} = \mu_t + \nu_c + \beta \Delta \log \text{GDP}_{ct} + u_{ct}$, ii) $\Delta \log \text{GDP}_{ct} - \Delta \log \text{NNDI}_{ct} = \mu_t + \nu_c + \beta \overline{\Delta \log \text{GDP}}_{ct} + u_{ct}$, and iii) $\Delta \log \text{GDP}_{ct} - \Delta \log \text{NNDI}_{ct} = \beta \overline{\Delta \log \text{GDP}}_{ct} + u_{ct}$ would all return the same estimate of β.

relative share of SMEs, such that

$$\frac{\partial(\Delta \log \text{GDP}_{ct} - \Delta \log \text{NNDI}_{ct})}{\partial \Delta \log \text{GDP}_{ct}}$$

$$= \beta + \gamma \, \text{SME}_{c.} - \delta \left(\text{DBD}_{c2008} - \text{DBD}_{..} \right) - \kappa \left(\text{DBD}_{c2008} - \text{DBD}_{..} \right) * \left(\text{SME}_{c.} - \text{SME}_{..} \right).$$

Table 4 reports the results. During the 2000-2007 period, income risk sharing between countries was more than 50 percent—see column (1)—significantly higher than what was found by Sørensen and Yosha (1998) for EU countries. This average level of income risk sharing declined markedly, to 34 percent, after the crisis broke.[9] The R-square is substantially higher in the latter period, 0.53 versus 0.06, indicating that the dispersion between countries was markedly less in the recession. The amount of risk sharing declines steeply in the fraction of small firms, see columns (2) and (5), with quite similar coefficients before and after the crisis broke. Domestic banking dependence has a negative impact on income smoothing, with statistical significance about the 5 percent level in the second period. These results, using a quite different metric, confirms the patterns of the previous section. Small firms are not well integrated in international financial markets (directly or indirectly) and less dependence on domestic banks result in more risk sharing.

Table 5 reports on risk sharing between NUTS regions within countries–the inclusion of separate time dummies for each country implies that the results are "orthogonal" to the country results reported in the previous table. Not surprisingly, the amount of risk sharing is much larger within countries, at about 70 percent before the crisis, but maybe more surprisingly, income is almost totally independent of NUTS-level GDP after 2007. The presence of many SMEs were detrimental to risk sharing before the recession but not significantly so after 2008. Domestic bank dependence played a negative role in income smoothing in both periods, although more strongly so before the recession. Finally, where many SMEs are present, domestic bank dependence is particularly bad for risk sharing, although this pattern was stronger before the recession.

The overall picture from Tables 4 and 5 is that, maybe due to government insurance pro-

---

[9]The coefficient to GDP growth is not quite robust across columns, even if the SME share has been demeaned which obfuscates the interpretation of the second column slightly. This is due to the limited sample size.

grams, income risk within countries were very well insured in the recession. However, this is cold comfort as the recession hit countries with very different force, impacting southern Europe and Ireland much harder than northern European EMU members, and risk sharing between countries contracted in the recession because of lack of deep inter-country integration of capital and banking markets within the EU. Regarding the main point of our article, the risk sharing regressions provides robust evidence, at both the country level and NUTS2 level even if these are orthogonal cuts of the data, that SMEs have less access to risk capital, that domestic bank dependence lowers deeper capital market integration, and that domestic bank dependence is especially detrimental to SMEs.

6   Conclusion

Small and medium business are sensitive to banking shocks and they receive little outside capital, making their production vulnerable to financial shocks at the same time as their owners are unable to share substantial equity risk with outsiders. Conforming with these statements, our results in this paper overwhelmingly show that economies with many small firms did better in terms of risk sharing with other countries and were less exposed to the recent crisis if they had access to credit from non-local banks. The simplest way to remedy this situation might be via real banking integration, by which we mean that banks in one country share risk by lending in another country, as opposed to bank-to-bank integration where banks lend to each other in a way that can be quickly reversed when crises hit.

Real banking integration in the United States had well documented beneficial effects. Enhancing access of SMEs to bond and equity markets—one of the declared goals of the capital market union suggested by the president of the European Commission—is a an important complementary solution. However, a working capital market union will still only work in conjunction with real banking integration, since, even with more highly developed and integrated bond and equity markets most SMEs in Europe will remain bank-dependent due to their small size and opaqueness. Of course, banking integration poses its own problems— too-big to fail issues come to mind—and the cross-border consolidation in the banking sector that most likely would be required to achieve real banking integration in Europe faces con-

siderable political headwind. But in our view these are not issues that outweigh the benefits of real banking integration. In fact, our results strongly support the view that it was this lopsided nature of banking integration in Europe with its focus on bank-to-bank lending that effectively made periphery countries more—rather than less—vulnerable to both common and idiosyncratic shocks. We therefore believe that, if financial integration in Europe is to succeed, real banking integration will have to be an important part of it.

References

Artis, Michael J., and Mathias Hoffmann. 2011. "The Home Bias, Capital Income Flows and Improved Long-Term Consumption Risk Sharing between Industrialized Countries." *International Finance*, 14(3): 481–505.

Asdrubali, Pierfederico, Bent E. Sørensen, and Oved Yosha. 1996. "Channels of Interstate Risk Sharing: United States 1963-1990." *Quarterly Journal of Economics*, 111 (4): 1081–1110.

Becker, Sascha O., and Mathias Hoffmann. 2006. "Intra- and international risk-sharing in the short run and the long run." *European Economic Review*, 50(3): 777–806.

Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan. 2004. "How much should we trust Differences-in-Differences Estimates?" *Quarterly Journal of Economics*, 119 (1): 249–275.

Cetorelli, Nicola, and Linda Goldberg. 2012*a*. "Banking Globalization and Monetary Transmission." *Journal of Finance*, 67(5): 1811–1843.

Cetorelli, Nicola, and Linda S. Goldberg. 2012*b*. "Liquidity management of U.S. global banks: Internal capital markets in the great recession." *Journal of International Economics*, 88(2): 299–311.

Demyanyk, Yuliya, Charlotte Ostergaard, and Bent Sørensen. 2007. "US Banking Deregulation, Small Businesses, and Interstate Insurance of Personal Income." *Journal of Finance*, LXII, No. 6: 2763–2801.

Ferrando, Annalisa, Alexander Popov, and Gregory F. Udell. 2015. "Sovereign Stress, Nonconventional Monetary Policy, and SME Access to Finance."

Ferrando, Annalisa, and Klaas Mulier. 2013. "Firms Financing Constraints – do perceptions match the actual situation?" European Central Bank Working Paper Series 15777.

Hale, Galina, and Maurice Obstfeld. 2014. "The euro and the geography of international debt flows." Federal Reserve Bank of San Francisco Working Paper Series 2014-10.

Hoffmann, Mathias, and Iryna Shcherbakova-Stewen. 2011. "Consumption Risk Sharing over the Business Cycle: The Role of Small Firms' Access to Credit Markets." *The Review of Economics and Statistics*, 93(4): 1403–1416.

Hoffmann, Mathias, and Toshihiro Okubo. 2013. "'By a Silken Thread': Regional Banking Integration and Pathways to Financial Development in Japan's Great Recession." CESifo Group Munich CESifo Working Paper Series 4090.

Hoffmann, Mathias, and Toshihiro Okubo. 2015. "'By a Silken Thread': Regional Banking Integration and Pathways to Financial Development in Japan's Great Recession." Revised evrsion of CESifo-DP 4090, unbpublished.

Imai, M., and S. Takarabe. 2011. "Bank Integration and Transmission of Financial Shocks: Evidence from Japan." *American Economic Journal: Macroeconomics*, 3(1): 155–183.

International Monetary Fund (IMF). 2015. "Chapter 2: International Banking after the Crisis: Increasingly Local and Safer?" *Global Financial Stability Report (April)*.

Kalemli-Ozcan, Sebnem, Elias Papaioannou, and Fabrizio Perri. 2013. "Global banks and crisis transmission." *Journal of International Economics*, 89(2): 495 – 510.

Kose, M. Ayhan, Eswar S. Prasad, and Marco E. Terrones. 2009. "Does financial globalization promote risk sharing?" *Journal of Development Economics*, 89(2): 258–270.

Mace, Barbara. 1991. "Full Insurance in the Presence of Aggregate Uncertainty." *Journal of Political Economy*, 99 (5): 928–56.

Morgan, Donald P., Bertrand Rime, and Philip E. Strahan. 2004. "Bank Integration and State Business Cycles." *Quarterly Journal of Economics*, 119 (4): 1555–85.

Ozer-Balli, Hatice, and Bent Sørensen. 2013. "Interaction effects in econometrics." *Empirical Economics*, 45(1): 583–603.

Peek, J., and E. S Rosengren. 2000. "Collateral Damage: Effects of the Japanese Bank Crisis on Real Activity in the United States." *The American Economic Review*, 90(1): 30–45.

Peek, Joe, and Eric S. Rosengren. 1997. "The International Transmission of Financial Shocks: The Case of Japan." *The American Economic Review*, 87(4): pp. 495–505.

Rajan, Raghuram G., and Luigi Zingales. 1998. "Financial Dependence and Growth." *The American Economic Review*, 88(3): 559–586.

Schnabel, Isabel, and Christian Seckinger. 2015. "Financial Fragmentation and Economic Growth in Europe." GSME Discussion Paper Series.

Sorensen, Bent E., and Oved Yosha. 1998. "International risk sharing and European monetary unification." *Journal of International Economics*, 45(2): 211–238.

Sørensen, Bent E., Yi-Tsu Wu, Oved Yosha, and Yu Zhu. 2007. "Home Bias and International Risk Sharing: Twin Puzzles Separated at Birth." *Journal of International Money and Finance*, 26: 587–605.

Table 1: Domestic Bank Dependence, SMEs and crisis transmission

	Country	NUTS2	Country-sector
$Crisis_t \times SME^k \times (1 - DBD)^k$	**3.09**	**2.87**	**0.70**
	(1.31)	(0.76)	(0.17)
$Crisis_t \times SME^k$	0.05	0.06	**−0.10**
	(0.16)	(0.07)	(0.04)
$Crisis_t \times (1 - DBD)^k$	**0.14**	**0.08**	0.07
	(0.07)	(0.03)	(0.06)
R^2	0.18	0.11	0.29
Adj. R^2	0.15	0.10	0.22
Num. obs.	164	2310	905.00

*NOTES:*The sample includes the 11 EMU countries Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal and Spain. The sample period is 1999-2013 for the country-level and country-sector regressions, 2000-20111 for the regional regressions and 2000-2011 for the region-level regressions. Standard errors in parentheses. Standard errors are clustered by time and by country / region / country-sector in the country- region- and country-sector regresssions respectively. Coefficients in bold are significaint at the ten percent level or higher. SME and (1-DBD) are cross-sectionally demeaned.

Table 2: Domestic bank dependence, SMEs and crisis transmission by country group

	Country-level		Regional		Country-sector	
$Crisis_t \times SME^k \times (1-DBD)^k$	2.24	**2.08**	**2.83**	1.05	**0.66**	**0.27**
	(1.64)	(1.15)	(0.94)	(0.81)	(0.17)	(0.13)
$Crisis_t \times SME^k$	0.05	0.00	0.06	−0.08	**−0.09**	−0.07
	(0.14)	(0.15)	(0.07)	(0.12)	(0.04)	(0.04)
$Crisis_t \times (1-DBD)^k$	0.11	0.06	**0.08**	−0.02	0.05	**−0.05**
	(0.09)	(0.08)	(0.04)	(0.02)	(0.05)	(0.02)
Core Dummy	0.02		0.00		**0.02**	
	(0.02)		(0.01)		(0.01)	
Greece Dummy		**−0.06**		**−0.07**		**−0.13**
		(0.03)		(0.03)		(0.05)
R^2	0.19	0.23	0.11	0.18	0.29	0.32
Adj. R^2	0.16	0.19	0.10	0.16	0.22	0.25
Num. obs.	164	164	2310	2310	905.00	905.00

NOTES: The table presents the transmission regression that include an interaction of the $Crisis_t$ indicator with a dummy for the Core economies or for Greece. The core economies include Belgium, France, Germany and the Netherlands. Regressions in columns 1 and 2 are at the country-level, those in columns 3 and 4 at the regional level. Those in columns 5 and 6 use country-sector data. The sample includes the 11 EMU countries Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal and Spain. The sample period is 1999-2013 for the country-level and country-sector regressions, 2000-20111 for the regional regressions and 2000-2011 for the region-level regressions. Standard errors in parentheses. Standard errors are clustered by time and by country / region / country-sector in the country- region- and country-sector regresssions respectively. Coefficients in bold are significaint at the ten percent level or higher.

Table 3: Domestic Bank Dependence, SMEs and crisis transmission – robustness of country-sector results

	Country-time effects	sector-time effects	before-after
$Crisis_t \times SME^{s,k} \times (1 - DBD)^k$	−0.07	−0.07	
	(0.05)	(0.07)	
$Crisis_t \times SME^{s,k}$	0.19	**0.68**	
	(0.14)	(0.23)	
$SME^{s,k} \times (1 - DBD)^k$			0.09
			(0.06)
$SME^{s,k}$			**−0.21**
			(0.08)
$(1 - DBD)^k$			**−0.15**
			(0.09)
Constant			**0.22**
			(0.11)
R^2	0.48	0.39	0.13
Adj. R^2	0.32	0.27	0.08
Num. obs.	905.00	905.00	65

NOTES: Columns 1 and 2 report the panel country-sector transmisson regression, including country-time or sector-time effects respectively.Standard errors (in parentheses) are clustered by country-sector and time. Column 3 reports the results of a 'before-after' cross-sectional regression of post-2008 average country-sector growth rates on the pre-2008 characteristics. The observation period is 1999-2013 for the 11 EMU countries Austria, Belgium Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal and Spain.

Table 4: Local bank lending, SMEs and crisis transmission: across country evidence

| | Risk Sharing 2000-2011 between countries | | | | | |
	2000-2007			2008-2011		
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta \log GDP$	0.54**	0.55**	0.49**	0.34**	0.51***	0.61***
	(2.34)	(2.40)	(2.02)	(2.41)	(3.49)	(4.12)
$\Delta \log GDP * SME$		–8.61	–7.85		–8.83**	–4.45
		(–1.64)	(–1.46)		(–2.47)	(–1.09)
$\Delta \log GDP * (1 - DBD)$			1.29			1.86*
			(0.75)			(1.95)
Adj. R sq.	0.058	0.091	0.082	0.526	0.604	0.644
No. obs.	64	64	64	40	40	40

NOTES: The table displays in columns (1)-(3), the coefficient β from the regression $\Delta \log GDP_{ct} - \Delta NNDI_{ct} = \mu_t + \nu_c + \beta \Delta \log GDP_{ct} + u_{ct}$, while columns (4)-(6) displays the coefficients from the regression $\Delta \log GDP_{ct} - \Delta NNDI_{ct} = \mu_t + \nu_c + \beta \Delta \log GDP_{ct} + \gamma (\Delta \log GDP_{ct} - \Delta \log GDP_{.t} - \Delta \log GDP_{c.}) * (SME_{c.} - SME_{..}) + u_{ct}$. Columns (7)-(9) displays the coefficients in the regression $\Delta \log GDP_{ct} - \Delta NNDI_{ct} = \mu_t + \nu_c + \beta \Delta \log GDP_{ct} + \gamma (\Delta \log GDP_{ct} - \Delta \log GDP_{.t} - \Delta \log GDP_{c.}) * (SME_{c.} - SME_{..}) + \delta (\Delta \log GDP_{ct} - \Delta \log GDP_{.t} - \Delta \log GDP_{c.}) * (FI_{c2008} - FI_{..}) + u_{ct}$. The sample includes the 11 EMU countries Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal and Spain. The sample period is 1999-2013 for the country-level and country-sector regressions, 2000-20111 for the regional regressions and 2000-2011 for the region-level regressions. Standard errors in parentheses. Standard errors are clustered by time and by country / region / country-sector in the country- region- and country-sector regresssions respectively. Coefficients in bold are significaint at the ten percent level or higher.

Table 5: Local bank lending, SMEs and crisis transmission: within country evidence

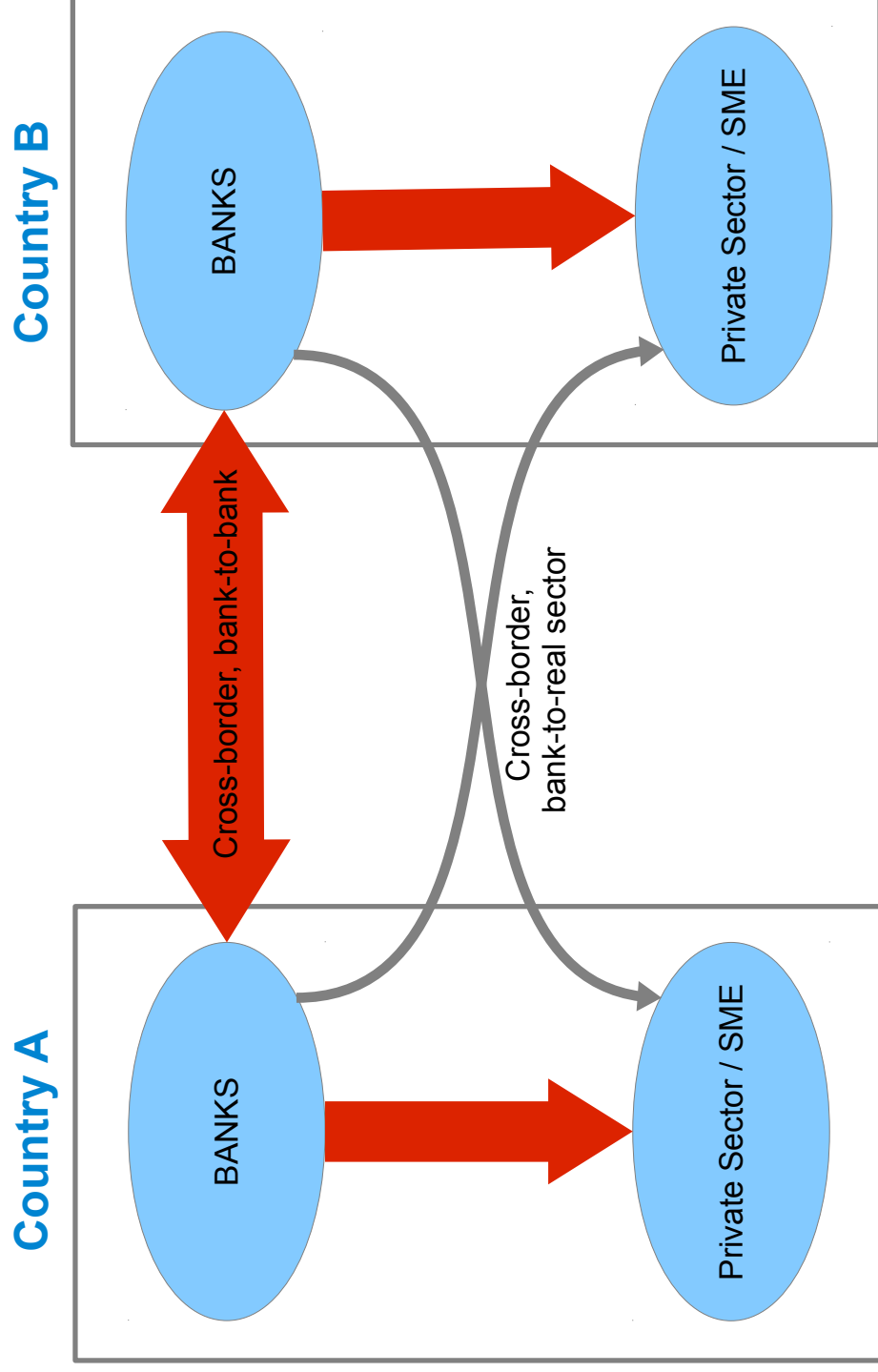|	Within-Country Risk Sharing 2000-2011 between NUTS2 regions							
	2000-2007				2008-2011			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta \log$ GDP	0.72***	0.73***	0.70***	0.65***	0.97***	0.97***	0.95***	0.95***
	(26.54)	(27.10)	(25.84)	(22.27)	(23.64)	(23.59)	(22.71)	(22.47)
*SME		−2.32***	−2.98***	−2.49***		−0.82	−1.00	−0.71
		(−5.07)	(−6.39)	(−5.21)		(−1.01)	(−1.23)	(−0.72)
*(1-DBD)			1.35***	1.56***			0.71**	0.72**
			(5.31)	(6.08)			(2.39)	(2.39)
SME(1-DBD)				25.11***				5.19
				(4.30)				(0.53)
No. obs.	1014	1014	1014	1014	631	631	631	631

NOTES: The table displays in columns (1)-(2), the coefficient β from the regression $\Delta \log \text{GDP}_{ct} - \Delta \text{NNDI}_{ct} = \mu_t + \nu_c + \beta \Delta \log \text{GDP}_{ct} + u_{ct}$, while columns (3)-(4) displays the coefficients from the regression $\Delta \log \text{GDP}_{ct} - \Delta \text{GDP}_{ct} = \mu_t + \nu_c + \beta \Delta \log \text{GDP}_{ct} + \gamma(\Delta \log \text{GDP}_{ct} - \Delta \log \text{GDP}_{.t} - \Delta \log \text{GDP}_{c.}) * (\text{SME}_{c.} - \text{SME}_{..}) + u_{ct}$. Columns (5)-(6) displays the coefficients in the regression $\Delta \log \text{GDP}_{ct} - \Delta \text{NNDI}_{ct} = \mu_t + \nu_c + \beta \Delta \log \text{GDP}_{ct} + \gamma(\Delta \log \text{GDP}_{ct} - \Delta \log \text{GDP}_{.t} - \Delta \log \text{GDP}_{c.}) * (\text{SME}_{c.} - \text{SME}_{..}) + \delta(\Delta \log \text{GDP}_{ct} - \Delta \log \text{GDP}_{.t} - \Delta \log gpd_{c.}) * (\text{SME}_{c.} - \text{SME}_{..}) * (\text{DBD}_{..} - \text{DBD}_{c2008}) + u_{ct}$. The sample includes the 11 EMU countries Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal and Spain. The sample period is 2000-2011. Standard errors in parentheses are clustered by time and country / region / country-sector in the country-, region-, and country-sector regressions, respectively.

Figure 1: Cross-border bank lending in selected Eurozone countries
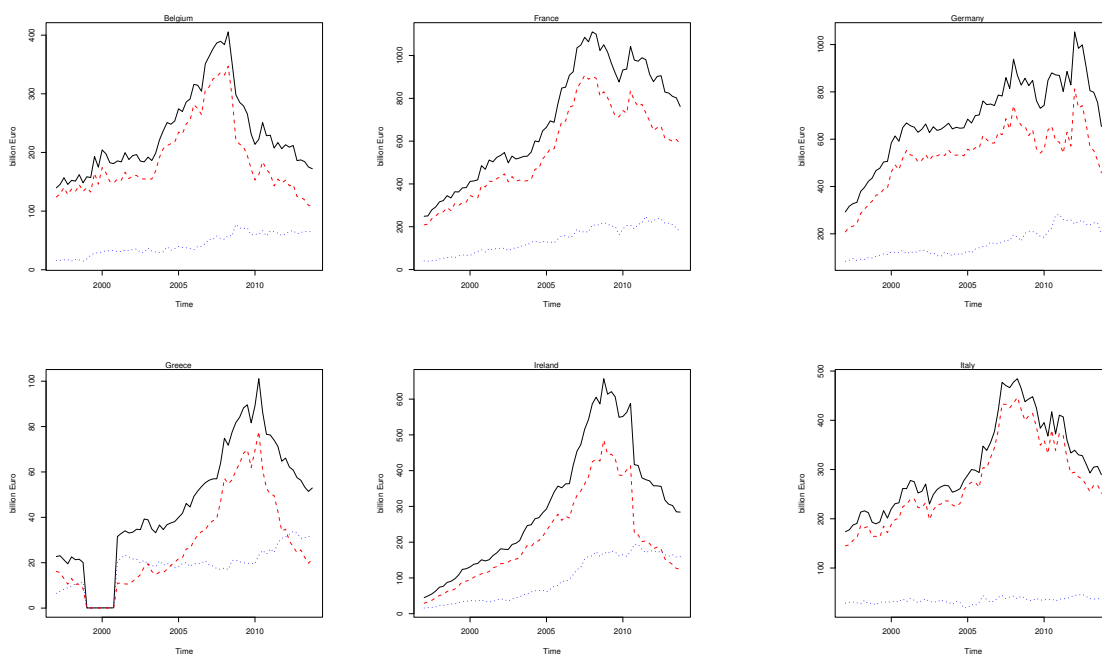
NOTES: The figure plots cross-border lending by foreign banks to the respective country. The black solid line gives the total, the red / dashed line the lending by foreign banks to domestic banks and the blue / dotted line the lending of foreign banks to the domestic non-bank sector (including governments). The source is the Joint BIS-IMF-World Bank external debt hub data base.
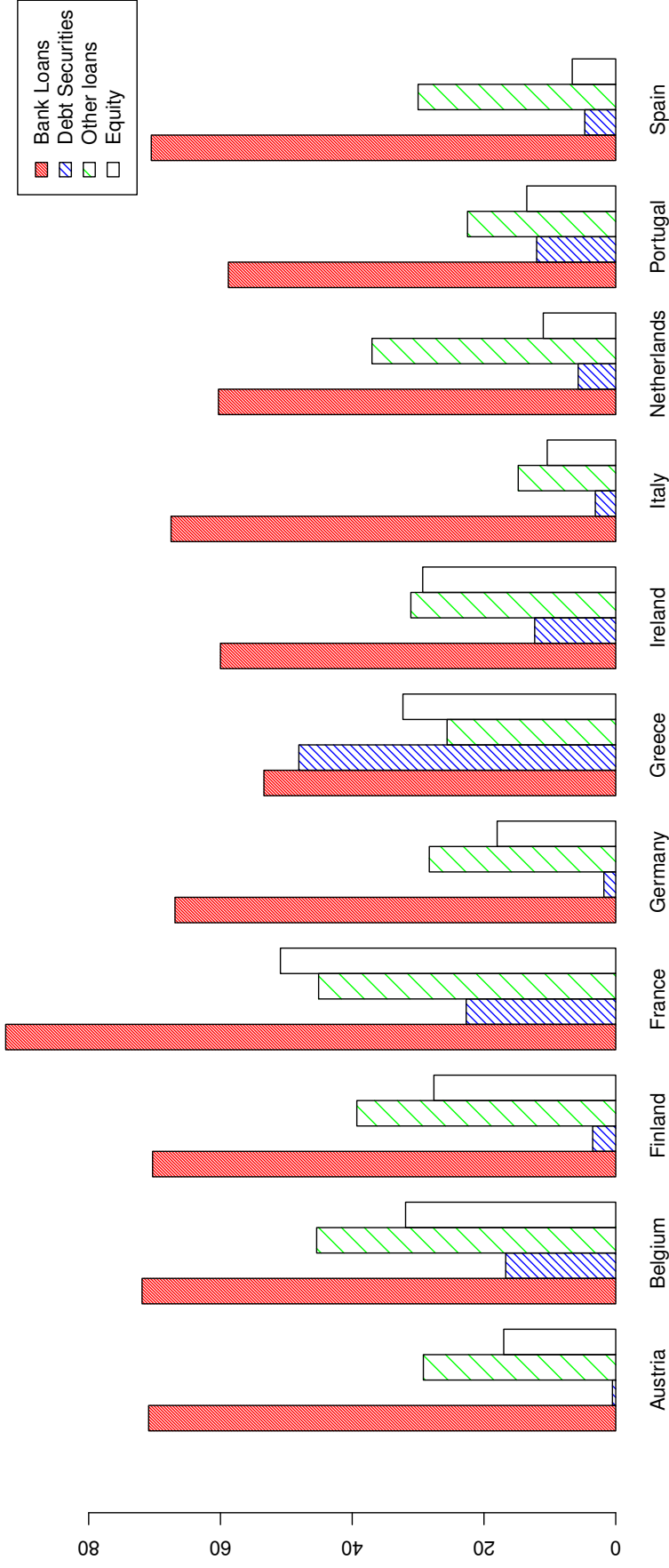
Figure 2: Bank-to-Bank integration *vs.* Bank-to-real sector integration

Country A

Country B

BANKS

BANKS

Private Sector / SME

Private Sector / SME

Cross-border, bank-to-bank

Cross-border, bank-to-real sector

NOTES: The figure conceptualizes the structure of banking integration in the Eurozone in the years before the financial crisis. cross-border integration mainly took place between banks (bank-to-bank integration) with net flows largely in the direction of the periphery country (big red arrow in the middle). Cross-border flows from banks to the real sector remained very limited (thin grey arrows). This left periphery economies vulnerable to sudden stops in banking flows (due to the global crisis) while keeping the domestic banking sector exposed to country-specific shocks due to its domestically concentrated loan portfolio.

Figure 3: Bank dependence of SMEs in the Eurozone

Sources of external finance for SMEs (source: SAFE 2011)

Bank Loans	
Debt Securities	
Other loans	
Equity	

Austria Belgium Finland France Germany Greece Ireland Italy Netherlands Portugal Spain

80 60 40 20 0

NOTES: The figure reports the fraction of SMEs (firms with fewer than 250 employees) reporting to have used or to be currently using the respective source of external finance. The data source is the survey of access to finance of enterprises (SAFE) 2011 for 11 Eurozone countries.

Figure 4: Domestic bank dependence and post-crisis SME financial conditions
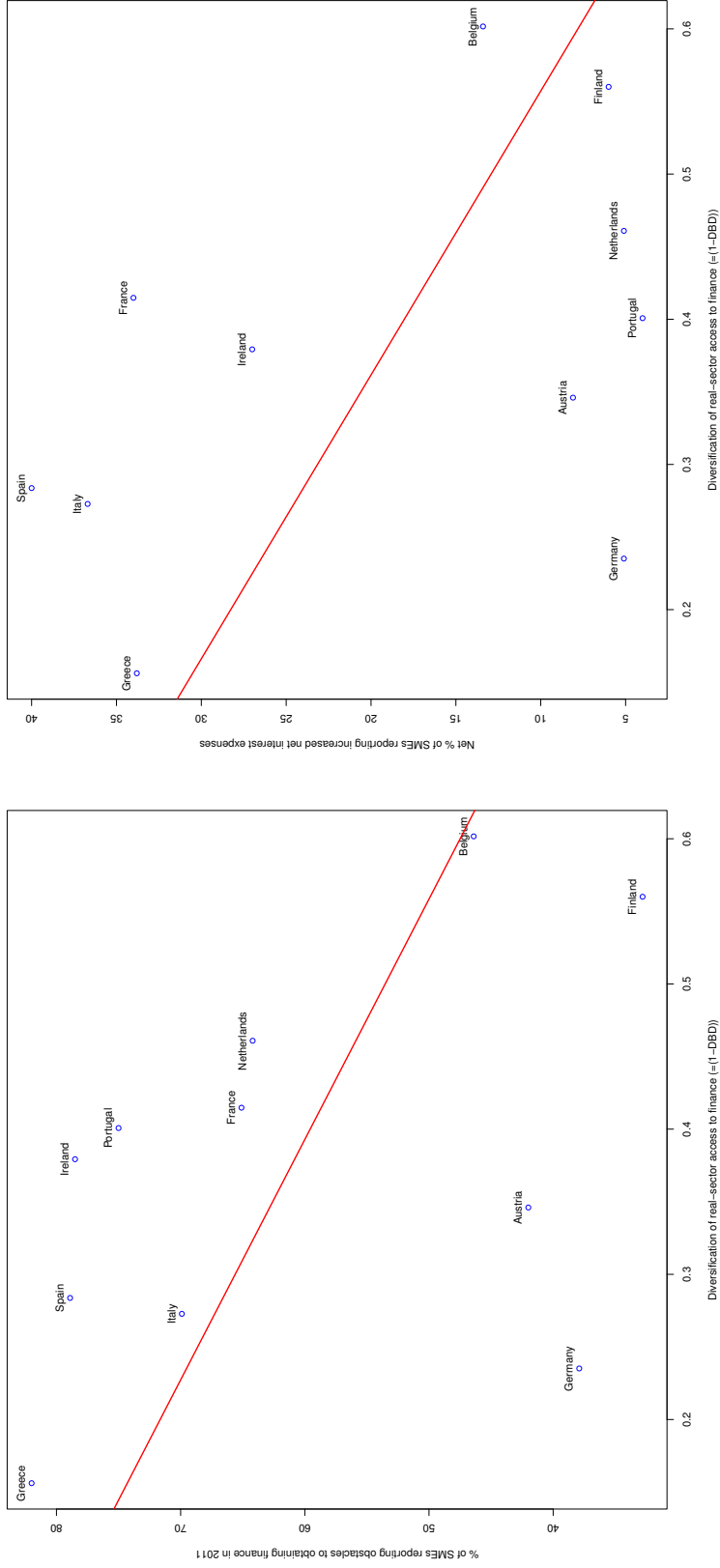
NOTES: The left panel plots the fraction of firms that reported any obstacles in obtaining finance in the ECB-EU Commission's survey of access to finance of enterprises (SAFE) 2011 against our measure of diversification of access to finance, $DAB^k = 1 - DBD^k$. The right panel plots the difference of the percentage of firms reporting increased interest expenses minus the percentage of firms reporting decreased interest rate expenses as reported in SAFE 2011 against DAB^k. For the two regression lines, the slope (t-stat) $[R^2]$ in the left panel is -0.60 (-1.51), [0.20] and in the right panel -51.15 (-1.58) [0.22].

Figure 5: A European banking shock under high and low domestic bank dependence

Country / Region with low share of SME

Country /Region with high share of SME
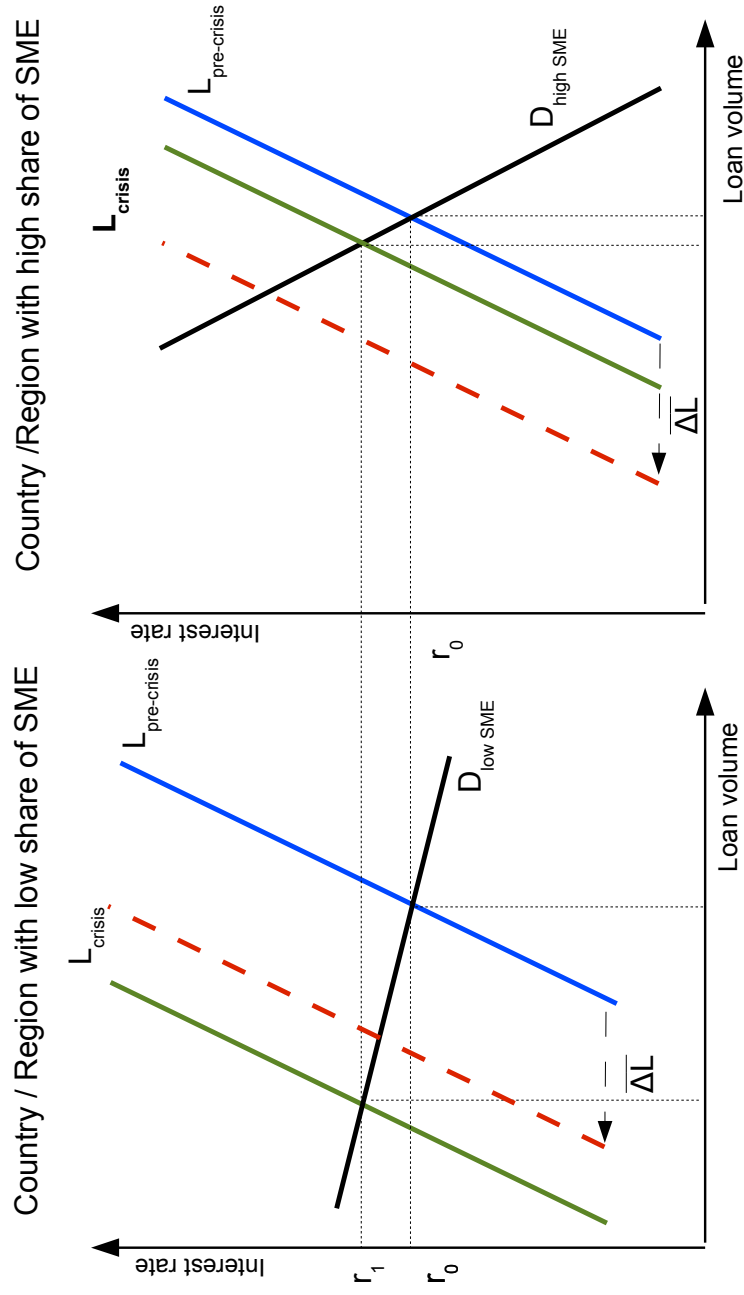
NOTES: The left panel shows a low-SME country, the right one a high-SME country. In both countries, pre-crisis loan supply is given by the loan supply curve L_0. A European banking shock shifts the local loan supply curves inwards by ΔL for any given interest rate, as indicated by the red, dashed supply curves. Under high domestic bank dependence, the equilibrium is given by the intersection of these red (dashed) supply curves with the respective country's loan demand curve. Because foreign banks cannot directly lend to the private sector, real sector borrowing rates remain different after the shock. Conversely, when domestic bank dependence is low, real sector borrowing rates will equalize (at the rate r_1) across countries, with supply contracting further in the low-SME country and expanding (relative to the red, dashed supply curve) in the high-SME country (green, solid supply curves).

Figure 6: Post-2008 sector-level growth in countries with low and high bank dependence
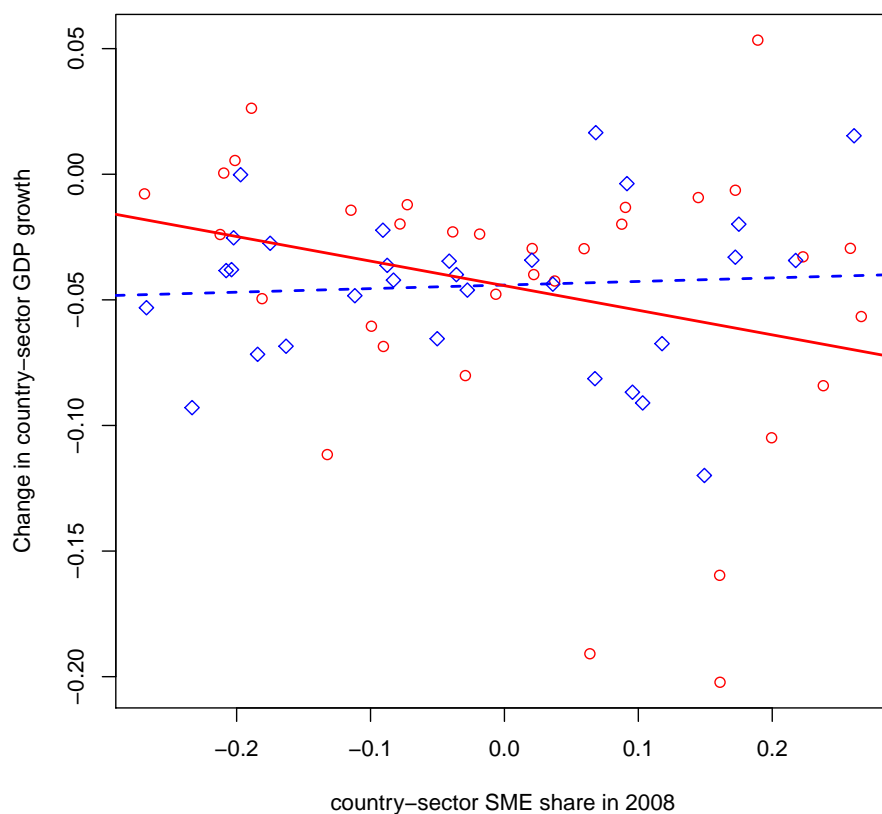
NOTES: The graph plots the change in from pre-2008 to post-2008 average growth rates at the country-sector level against the pre-2008 SME share in a country-sector. Blue (red) diamonds (dots) indicate sectors in countries with above (below) median domestic bank dependence. The blue, dashed (red, solid) lines indicate the regression relationship between growth and SME shares for the sample of blue (red) diamonds (dots) . Data from 11 EMU countries over the period 2000-2013. Sectors with growth rates below -30 percent are excluded.