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

Mathias Hoffmann, Bent E. Sørensen

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Mathias Hoffmann, Bent E. Sørensen

Abstract

The paper studies the role of small businesses (SME) in the transmission of the Eurozone crisis to member countries and whether regions or countries with many SMEs were less able to share risk. Our analysis draws attention to domestic bank dependence—defined as the share of domestic private credit originated by domestic banks—as a key variable 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 between 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.

JEL Classification: F30, F36, F40, F45.

Keywords: small and medium enterprises, SME access to finance, banking integration, domestic bank dependence, risk sharing, international transmission.

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Contact: Mathias Hoffmann is at the University of Zurich, Dept. of Economics, International Trade and Finance Group, Zurichbergstrasse 14, CH-8032 Zurich. 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 (mathias.hoffmann@uzh.ch); Bent E. Sørensen is with the Department of Economics, University of Houston, Houston, TX, USA. He is also affiliated with the Centre for Economic Policy Research (CEPR) (besorensen@uh.edu).

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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 depend on loans from local banks, which makes them particularly vulnerable to shocks to domestic banking shocks. Where credit is predominantly provided by the bond market or by foreign banks, regions with a high share of SMEs are less exposed to local shocks. This is what we document in this paper: during the financial crisis, European regions and sectors with many SMEs experienced relatively steeper 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 more pronounced in countries with higher levels of domestic bank dependence.

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 and income, for example by allowing foreign-owned firms to tap sources of finance from abroad when domestic credit markets dry up. However, SMEs are locally owned and therefore unable to share risk via text-book cross-border ownership of productive assets.

SMEs are also dependent on local provision of debt. Most SMEs are too small and too opaque to borrow from the 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, 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 country than would be purely national banks with 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 borrow from a branch of a Dutch bank in Rotterdam directly. The crisis has shown that “bank-to-bank” integration is vulnerable to local shocks: as domestic banking sectors with undiversified portfolios of domestic debt came close to insolvency, foreign bank lending to domestic banks dried up and credit to the real sector contracted. In this way 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 lower dependence on domestic bank lending would have helped shield output and income against local, idiosyncratic shocks as well as against foreign banking sector 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 locational banking statistics from the Bank for International Settlements (BIS), shows that this is indeed the case. The figure presents lending by foreign banks for a range of EMU countries. Flows of bank loans surged 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 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 U.S. subprime crisis spilling over to Europe and leading to a worldwide crisis in interbanking markets) can be seen as a common factor which had differential impacts across countries, depending on their 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 in the sense that the real sector was unable 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 the core country, and the other as the periphery country. The thick red arrow indicates the large 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 domestic shocks. 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. Second, an international funding shock to banks in the periphery country may 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 c —abbreviated as DBD^c —

¹Specifically, banks in the EMU periphery countries mainly borrowed from banks located in core economies which in turn borrowed in the U.S. money market (Hale and Obstfeld (2014)).

²For 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.

we propose the share of total real sector credit that is provided by domestic banks:

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

We construct DBD^c using data from the Private Sector Credit Data base (PSCD) compiled by the BIS. 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 (which we describe in detail below) is at the annual frequency, we take fourth-quarter (end of-year) observations as annual values. We obtain a time-invariant (pre-crisis) measure for DBD^c by taking pre-2008 averages for each country.

Because we construct DBD^c as a pre-crisis average, it is an *ex ante* measure of how exposed aggregate credit supply in a country was to domestic banking sector shocks at the beginning of the Great Recession. The real effects in terms of output, consumption, or employment of any given drop in credit supply will depend on how elastic the private sector is in its choice of financing source. For example, a big firm may borrow from domestic banks in normal times and quickly switch to the bond market when the domestic banking sector is in distress. Conversely, many small and medium-sized enterprises cannot easily turn to bond or equity markets to raise external finance, making them vulnerable to domestic banking sector shocks. 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 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 country-level banking dependence (DBD^c). The second panel plots the share of firms reporting increased interest expenses minus the share of firms reporting decreased expenses against DBD^c. The two 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 patterns outlined in this section. First, we 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. Second, we 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 strand encompasses recent empirical work that has emphasized the particular financing constraints faced by small firms during the European financial and sovereign debt crisis and the third strand is the body of empirical research on international and intranational risk sharing.

Regarding the literature on the international transmission of banking sector shocks, we build on Peek and Rosengren (1997) and Peek and Rosengren (2000), who showed how the burst of Japan's property bubble in the 1990s was reflected in Japanese banks contracting lending in the United States. Imai and Takarabe (2011) use a similar approach to study how the same shock spread across 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 SME-financing constraints 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 nature of banking integration in the Eurozone with its focus of bank-to-bank integration 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) and Hoffmann and Okubo (2015) find that mechanisms similar to the ones we document for Europe were at work during Japan's lost decade. Our emphasis of the differential impact of international and domestic bank lending on sector-level growth during the Eurozone crisis closely connects our work to that of Schnabel and Seckinger (2015). While Schnabel and Seckinger (2015) focus on external finance dependence in the sense of Rajan and Zingales (1998), 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 focusing 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), Sørensen and Yosha (1998), Becker and Hoffmann (2006)). This literature has generally found that risk sharing between countries is limited compared to risk sharing between regions within countries, such as U.S. states. 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 partic-

ular 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 (Sørensen and Yosha (1998), Becker and Hoffmann (2006)).

Our own previous work has shown that banking integration in the United States following state-level deregulation has successfully contributed to improved risk sharing between federal states (Demyanyk, Ostergaard and Sørensen (2007)) and 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 actually happened—contributed 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.³

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

4.1. 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

³In fact, the nature of banking integration in Europe may explain why some earlier studies have found market-based financial systems to be superior to bank-based financial systems in providing international risk sharing for a country (Leibrecht and Scharler (2012)).

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 Figure 5, 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 arbitrated 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.

4.2. 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 interest 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 regression examines determinants of output growth. We estimate the relation

$$\Delta \log \text{GDP}_t^c = \text{CRISIS}_t \times [\alpha_1 \text{DBD}^c \times \text{SME}^c + \alpha_2 \text{SME}^c + \alpha_3 \text{DBD}^c] + \text{CONTROLS} + \varepsilon_t^c,$$

where $\Delta \log \text{GDP}_t^c$ is the growth rate of output in country c and year t . The abbreviation SME stands for the share of SMEs with less than 250 employees in the GDP of country c in 2008 and DBD is our measure of domestic bank dependence, the share of domestic banks in total private sector credit. 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 make up our set of controls in this and the following regressions.

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 Eurozone countries but that affected countries differently according to their specific vulnerabilities: the share of SMEs and the extent to which these SMEs were dependent on domestic banks for finance.

Our main interest is in the coefficient α_1 on the triple interaction between SME, DBD and the

⁴It 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 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.

crisis indicator. The stylized model would predict that this coefficient is negative: during the crisis, growth in countries with many SMEs was negatively affected, in particular when the real sector was very dependent on domestic banks for finance.

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

$$\Delta \log \text{GDP}_t^r = \text{CRISIS}_t \times [\alpha_1 \text{DBD}^{c(r)} \times \text{SME}^{c(r)} + \alpha_2 \text{SME}^{c(r)} + \alpha_3 \text{DBD}^{c(r)}] + \text{CONTROLS} + \varepsilon_t^r,$$

in which output growth now varies across sub-national regions (indexed by r). We call this the region-level specification and we estimate it using NUTS2-level data from Eurostat. Note that in the region-level specification DBD and SME continue to be measured at the country-level, with $c(r)$ indexing the country to which region r 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.

To the extent that SMEs benefitted from diversified access to finance during the crisis, we 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

$$\Delta \log \text{GDP}_t^{c,s} = \text{CRISIS}_t \times [\alpha_1 \text{DBD}^c \times \text{SME}_t^{c,s} + \alpha_2 \text{SME}_t^{c,s} + \alpha_3 \text{DBD}^c] + \text{CONTROLS} + \varepsilon_t^{c,s},$$

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. Since SME now varies by both country and sector, this specification delivers a large expansion in the cross-sectional variation of one of our two main conditioning variables and therefore increases the statistical power of our analysis.

4.3. 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.⁵ For all output measures, we obtain real per capita values by deflating with the respective national harmonized index of consumer prices (HICP) and using population data from 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.⁶ Specifically, we construct our measure SME as the share in gross value added (at the national level) and, for robustness, as the share in employment (at the 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 employment shares of small businesses are not generally available before 2008. We therefore use the 2008 values to construct SME^k .

4.4. Baseline results

The results of these three baseline specifications are summarized in Table 1. Consistent with our theoretical interpretation, the main coefficient of interest, α_1 , is negative in all three cases. This suggests that diversified access to finance was particularly important for countries, regions, or sectors with many SMEs. The stand-alone terms of SME and DBD are not generally significant in the first two specifications. Given that, in all our specifications, SME and 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 deviation of SME shares across countries is 0.06. The cross-country standard deviation of DBD is 0.13.

⁵Sectoral gross value added is obtained from Eurostat's *National Accounts by 10 branches* (nama_nace10_c). We drop agriculture, finance and insurance and public administration and limit our sample to six sectors (1-digit NACE rev 2 codes in parentheses) for which we also have data on the corresponding SME shares: industry except construction (BCDE), construction (F), wholesale and retail + transport and storage+accommodation and food services (GHI), information and communication (J), real estate (L), professional activities + administrative and support services (MN).

⁶http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/performance-review/index_en.htm

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 less (more) than the European average if domestic bank dependence 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 domestic bank dependence one standard deviation above (below) the Eurozone mean would have decreased (increased) annual post-crisis GDP growth in that sector by 1.4 percent per year.

4.5. Robustness

Table 2 displays results which illustrate how sensitive the results are to the exact sample of countries. 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 negative and in all specifications with the core dummy also very close to the baseline estimates in Table 1 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, because SME and DBD vary only by country. We therefore focus on variations of the country-sector level regressions in Table 3. 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 negative in both specifications and remains 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 depend-

ence, 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 3 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.⁷

Figure 6 visualizes the results from the cross-sectional 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 below-median (blue diamonds) and above-median (red dots) levels of domestic bank dependence, we find that there is a strong negative link between growth and SME shares in country-sectors with high domestic bank dependence. This negative link is not 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 “capital 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 Sørensen and Yosha (1998) find that mainly counter cyclical public saving smoothes consumption between EU countries. Our focus is on the capital market channel. Small businesses often do not have access to foreign equity or bank lending and

⁷As 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.

we examine if this is reflected in the amount of market risk sharing (which we will also refer to as “income smoothing”) obtained 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” received from other countries or regions. 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 such as profit flows within corporations and various forms of rent sharing.⁸ Of particular relevance 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 our 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 smooth-

⁸Not all the detailed channels of income smoothing have been studied. Retained earnings is a large component of the difference between gross product and net income. A large fraction of retained earnings are funds retained to replace depreciated machinery and this component is not of particular interest, while corporate savings contribute to risk sharing at the annual frequency but not much at longer frequencies (Sørensen and Yosha (1998)). Workers can be seen as implicit share holders, because firms smooth wages over time and across subsidiaries (Budd, Konings and Slaughter (2005)), and while the macro impact such channels of income smoothing are not well measured, they are likely large at shorter frequencies.

ing, 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

$$\Delta \log GDP_t^c - \Delta \log NNDI_t^c = \beta \Delta \log GDP_t^c + u_t^c,$$

where NNDI is (real, per capita) Net National Disposable Income, the superscript c refers to countries, and t to year. $\Delta \log GDP_t^c$ is defined as cross-sectionally and time-demeaned GDP-growth: $\Delta \log GDP_t^c - \underline{\Delta \log GDP}^c - \underline{\Delta \log GDP}_t$, where \underline{X}_t indicates that for any variable X the mean has been taken over all the countries in each time period, while \underline{X}^c indicates the mean over the years in the sample for country c . \underline{X} is the overall mean.

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 $\Delta \log GDP$ on $\Delta \log GDP$ 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 formulation of the regression in terms of deviations from the uninsurable aggregate component of GDP ($\Delta \log GDP_t$) is crucial for the risk sharing interpretation and, in fact, equivalent to a regression that includes time dummies instead of deviations. Including a country dummy is not essential, but it controls for constant country-specific differences in $\Delta \log GDP$ and

$\Delta \log \text{NNDI}$.⁹ 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)).

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

$$\Delta \log \text{GDPT}^c - \Delta \log \text{NNDIT}^c = \beta \Delta \log \text{GDPT}^c + \gamma \Delta \log \text{GDPT}^c \times [\text{SME}^c - \underline{\text{SME}}] + u_t^c,$$

where $\underline{\text{SME}}$ is the cross-sectional mean of SME. The logic of the regression is to measure how the response of the left-hand side to country-specific growth in GDP varies as a function of the prevalence of SME. To see this, note that this response can be written as

$$\frac{\partial \Delta \log \text{GDPT}^c - \Delta \log \text{NNDIT}^c}{\partial \Delta \log \text{GDPT}^c} = \beta + \gamma [\text{SME}^c - \underline{\text{SME}}]$$

By formulating the regression in terms of deviations of SME^c from its cross-country average, we ensure that the interpretation of β as the amount of risk sharing for a country with an average level of SME remains the same as before (see Ozer-Balli and Sørensen (2013)) for a detailed explanation of this issue). We further examine if risk sharing is a function of domestic banking dependence, estimating the relation

$$\Delta \log \text{GDPT}^c - \Delta \log \text{NNDIT}^c = \beta \Delta \log \text{GDPT}^c + \gamma \Delta \log \text{GDPT}^c \times [\text{SME}^c - \underline{\text{SME}}] + \delta \Delta \log \text{GDPT}^c \times [\text{DBD}^c - \underline{\text{DBD}}] + u_t^c.$$

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 and consistent with the findings of Artis and Hoffmann (2011). This average level of income risk sharing declined markedly, to 34 percent, after the crisis broke.¹⁰ The R-square is substantially higher in the latter period, 0.65 versus 0.21 before the crisis, for the regression without interaction terms, indicating that risk sharing patterns were more similar across countries 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

⁹The results are virtually unchanged if the country dummy is dropped

¹⁰The coefficient to GDP growth is not quite robust across columns, even if the SME share has been de-meaned which obfuscates the interpretation of the second column slightly. This is due to the limited sample size.

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.

Further, we want to explore whether domestic bank dependence, DBD, affects risk sharing and whether it does so more strongly in countries with many SMEs. We do not have many degrees of freedom at the country level and we move to the regional level where we estimate risk sharing equations similar to the ones we estimated for countries, for example,

$$\Delta \log GDPt^r - \Delta \log NNDIt^r = \beta \Delta \log GDPt + u_t^r,$$

where the superscript r refers to NUTS2 regions. For any variable X , \bar{X} is defined as the country-time demeaned variable $X^r - \bar{X}^c$ where \bar{X}^c indicates that the mean over regions within country c for time period t —this demeaning, which is equivalent to the inclusion of separate time dummies for each country, implies that the demeaned data driving the results are “orthogonal” to the country-level data underlying the results reported in the previous table. The interpretation is also different: the regional regressions measure how much risk on average (across countries) is shared between regions within each country. The results are not a function of how much risk is shared between countries and there are no mechanical reasons why the results of the regional regressions should or should not agree with the country-level regressions.

We estimate regressions interacted with country-level SME-dependence and domestic banking dependence:

$$\begin{aligned} \Delta \log GDPt^r - \Delta \log NNDIt^r = & \beta \Delta \log GDPt \\ & + \gamma \Delta \log GDPt^r \times [SME^c - \underline{SME}] + \delta \Delta \log GDPt^r \times [DBD^c - \underline{DBD}] \\ & + \kappa \Delta \log GDPt^r \times [DBD^c - \underline{DBD}] \times [SME^c - \underline{SME}] + u^c. \end{aligned}$$

In this regression, the impact of DBD on income smoothed varies with the relative share of SMEs, such that

$$\Delta \log GDPt^r = \beta + \gamma [SME^c - \underline{SME}] - \delta [DBD^c - \underline{DBD}] - \kappa [DBD^c - \underline{DBD}] \times [SME^c - \underline{SME}]$$

Table 5 reports on risk sharing between NUTS regions within countries. 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 was 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 programs, regional GDP-fluctuations within countries were very well insured in the recession. However, this is cold comfort as the recession hit entire 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 provide robust evidence, at both the country level and the NUTS2 level, 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. Conclusions

Small and medium-sized businesses are sensitive to banking shocks and they have little access to 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, the 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.

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 an important complementary solution. However, a working capital market union will still only work in conjunction with real banking integration because, 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, although cross-border lending is not predicated on mega-banks—and the cross-border consolidation in the banking sector that most likely would be required to achieve real banking integration in Europe faces considerable 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 the 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.

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Tables and figures

Table 1: Domestic Bank Dependence, SMEs and crisis transmission

	Country	NUTS2	Country-sector
$Crisis_t \times SME^c \times DBD^c$	-3.09** (-2.37)	-2.87** (-3.79)	-0.70** (-4.10)
$Crisis_t \times SME^c$	1.9**• (2.41)	0.06 (0.79)	0.34** (3.15)
$Crisis_t \times DBD^c$	-0.14** (-2.01)	-0.08** (-2.28)	-0.07 (-1.19)
R ²	0.18	0.11	0.29
Adj. R ²	0.15	0.10	0.22
Num. obs.	164.00	2310.00	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, 2000-2011 for the regional regressions and 2000-2011 for the region-level regressions. t-statistics in parentheses. Standard errors are clustered by time and by country / region / country-sector in the country- region- and country-sector regressions respectively. One (two) asterisks denote(s) significance at the 10 (5) percent level. SME and DBD are cross-sectionally demeaned.

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

	Country-level		Regional		Country-sector	
$Crisis_t \times SME^c \times DBD^c$	-2.24 (-1.37)	-2.08* (-1.81)	-2.8** (-3.00)	-1.05 (-1.30)	-0.6** (-3.88)	-0.2**• (-2.13)
$Crisis_t \times SME^c$	1.45 (1.46)	1.31* (1.75)	0.06 (0.79)	-0.08 (-0.68)	0.33□□ (3.00)	0.10 (1.19)
$Crisis_t \times DBD^c$	-0.11 (-1.29)	-0.06 (-0.77)	-0.08□ (-1.76)	0.02 (0.75)	-0.05 (-0.88)	0.05** (2.38)
$Crisis_t \times Core$	0.02 (0.93)		0.00 (0.19)		0.02* (1.77)	
$Crisis_t \times Greece$		-0.06** (-2.19)		-0.07** (-2.17)		-0.13** (-2.83)
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.	164.00	164.00	2310.00	2310.00	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, 2000-2011 for the regional regressions and 2000-2011 for the region-level regressions. t-statistics in parentheses. Standard errors are clustered by time and by country / region / country-sector in the country- region- and country-sector regressions respectively. One (two) asterisks denote(s) significance at the 10 (5) percent level.

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

	Sector-time effects	Country-time effects	before-after
$Crisis_t \times SME^{c,s} \times DBD^c$	-0.68** (-2.99)	-0.19 (-1.39)	
$Crisis_t \times SME^{c,s}$	0.36□□ (2.82)	0.05 (0.65)	
$SME^{c,s} \times DBD_{Hi}^c$			-0.22* (-1.95)
$SME^{c,s}$			0.01 (0.17)
DBD_{Hi}^c			0.15* (1.74)
Constant			-0.05 (-0.88)
R ²	0.39	0.48	0.13
Adj. R ²	0.27	0.32	0.08
Num. obs.	905.00	905.00	65.00

NOTES: Columns 1 and 2 report the panel country-sector transmission regression, including country-time or sector-time effects respectively. The t-statistics (in parentheses) are based on standard errors 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, $\Delta \log GDP_{post08}^{c,s}$ on the pre-2008 SME-shares and a dummy, DBD_{Hi}^c , that indicates countries with above-median levels of bank dependence: $\Delta \log GDP_{post08}^{c,s} = \alpha_1 SME^{c,s} \times DBD_{Hi}^c + \alpha_2 SME^{c,s} + \alpha_3 DBD_{Hi}^c + e^{c,s}$. 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: Domestic Bank Dependence, SMEs and risk sharing: cross-country

Risk sharing across 11 EMU countries, sample period: 2000-2011						
	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**
	(1.75)	(1.95)	(1.59)	(1.66)	(3.00)	(6.74)
$\Delta \log GDP \bullet SME$		-8.61*	-7.85		-8.83**	-4.45
		(-1.95)	(-1.56)		(-2.29)	(-1.42)
$\Delta \log GDD \bullet DBD$			-1.29			-1.86**
			(-0.85)			(-2.80)
Adj. R sq.	0.210	0.240	0.235	0.648	0.709	0.741
No. obs.	64	64	64	40	40	40

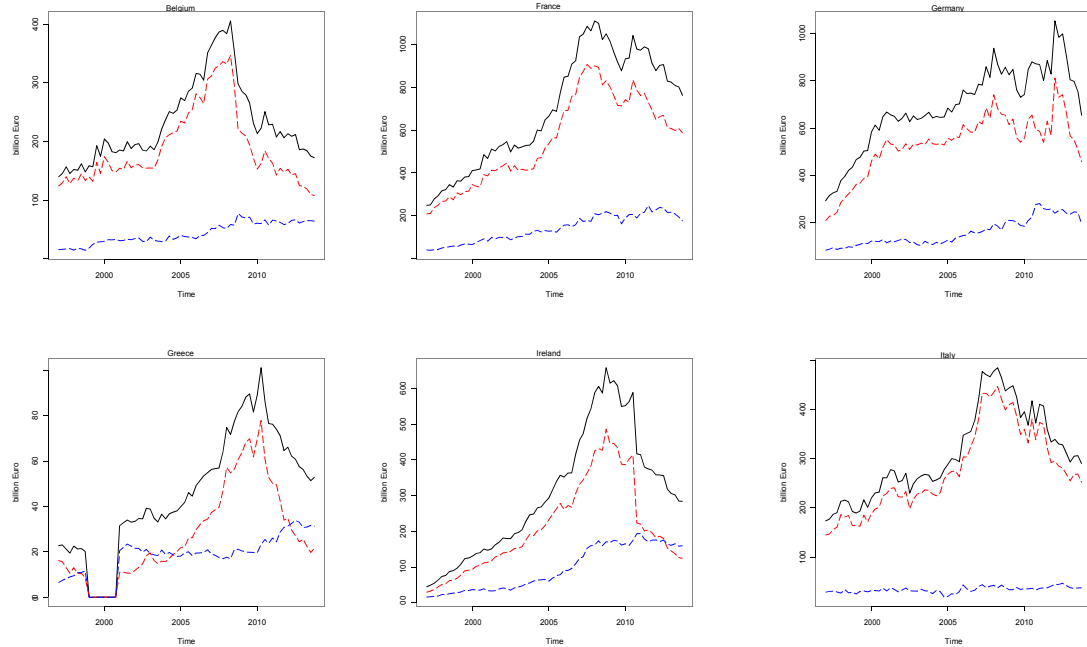
NOTES: The table reports the results (with obvious 0-restrictions in some columns) of estimating the regression $\Delta \log GDP_t^c - \Delta \log NNDI_t^c = \beta \Delta \log GDP_t^c + \gamma [SME_t^c - \underline{SME}] + \delta \Delta \log GDP_t^c \times [DBD_t^c - \underline{DBD}] + \text{error}$, where $\Delta \log GDP_t^c$ is defined as the country- and time-demeaned GDP-growth: $\Delta \log GDP_t^c = \Delta \log GDP_t - \Delta \log GDP_t^c$ where a line beneath X_t indicates that for any variable X the mean has been taken over countries for each time period, while a line beneath X^c indicates the mean over time for country c while \underline{X} is the overall mean. GDP is real per capita GDP and NNDI is real per capita net national income (NNDI is country- and time-demeaned in the same manner as GDP). SME is the country-average share gross value added of firms with less than 250 employees. DBD^c is the pre-2008 average of the ratio of lending by domestic banks to the private sector of country c divided by total credit to the private sector. Columns (1)-(4) report results for 2000-2007 while columns (4)-(6) report the corresponding results for the year 2008-2011. The sample includes the 11 EMU countries Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, and Spain. Standard errors in parentheses are clustered by country. One (two) asterisk(s) denote(s) significance at the 10 (5) percent level.

Table 5: Domestic Bank Dependence, SMEs and risk sharing: regions within countries

Within-country risk sharing – NUTS2 regions from 11 EU countries								
	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**
	(9.21)	(11.47)	(12.34)	(14.64)	(9.64)	(9.05)	(10.01)	(9.72)
*SME		-2.32**	-2.98**	-2.49**		-0.82	-1.00	-0.71
		(-2.74)	(-3.39)	(-4.79)		(-0.42)	(-0.60)	(-0.35)
*DBD			-1.35**	-1.56**			-0.71	-0.72
			(-3.26)	(-4.90)			(-1.13)	(-1.11)
*SME *DBD				-25.11**				-5.19
				(-3.48)				(-0.24)
No. obs.	1014	1014	1014	1014	631	631	631	631

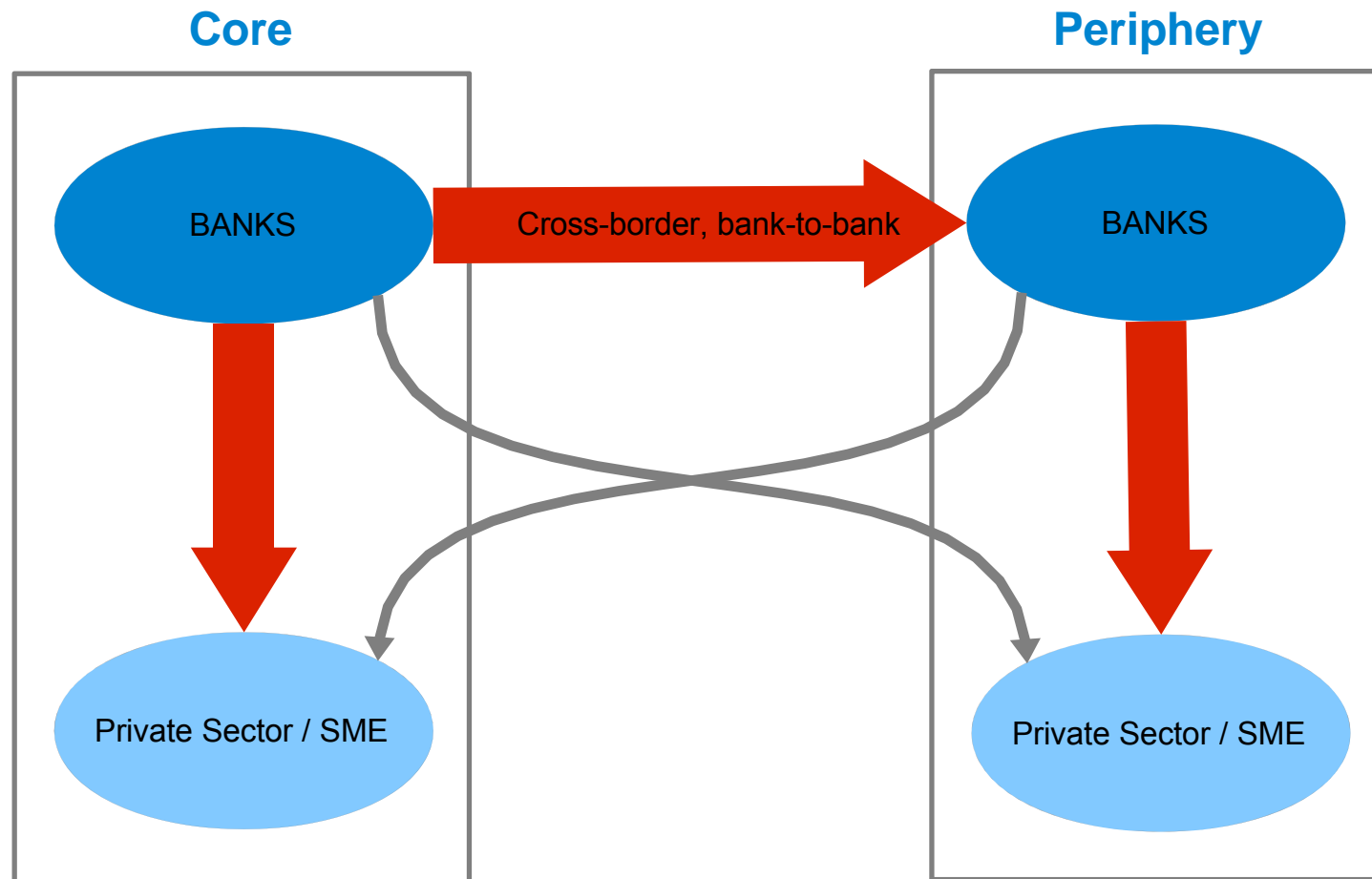
NOTES: The table displays the coefficients from estimating the regression equation $\Delta \log GDP_t^r - \Delta \log NNDI_t^r = \beta \Delta \log GDP_t^r + \gamma [SME_t^r - \underline{SME}] + \delta \Delta \log GDP_t^r \times [DBD_t^r - \underline{DBD}] + \kappa \Delta \log GDP_t^r \times [DBD_t^r - \underline{DBD}] \times [SME_t^r - \underline{SME}] + u^r$, imposing obvious 0-restrictions in some columns for the years 2000-2007 and 2008-2011. \underline{X}_t^r defined for any X as the country- and time-demeaned variable $X_t^r - \underline{X}^r$ where \underline{X}^r indicates that the mean over the regions within country c for time period t . GDP^r is real per capita gross value added of NUTS2-region r and NNDI^r is real per capita disposable income of region r (NNDI is country- and time-demeaned in the same manner as GDP). SME is the country-average share gross value added of firms with less than 250 employees. DBD^c is the pre-2008 average of the ratio of lending by domestic banks to the private sector of country c divided by total credit to the private sector. 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 country. One (two) asterisk(s) denote(s) significance at the 10 (5) percent level.

Figure 1: Cross-border bank lending in selected Eurozone countries



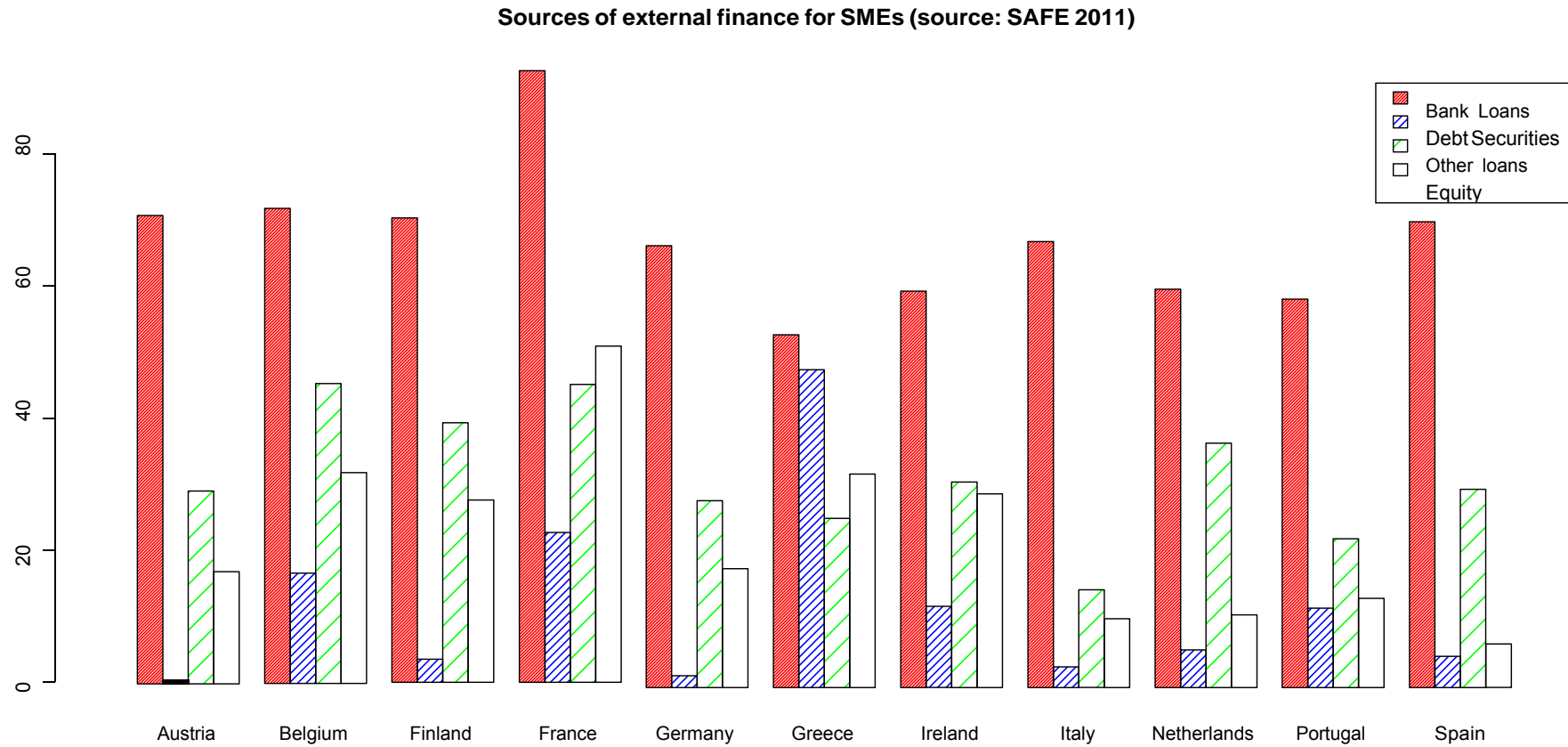
NOTES: The figure plots cross-border lending by foreign banks to the respective country. The black solid line gives the total, the red / dashed line the lending by foreign banks to domestic banks and the blue / dotted line the lending of foreign banks to the domestic non-bank sector (including governments). 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



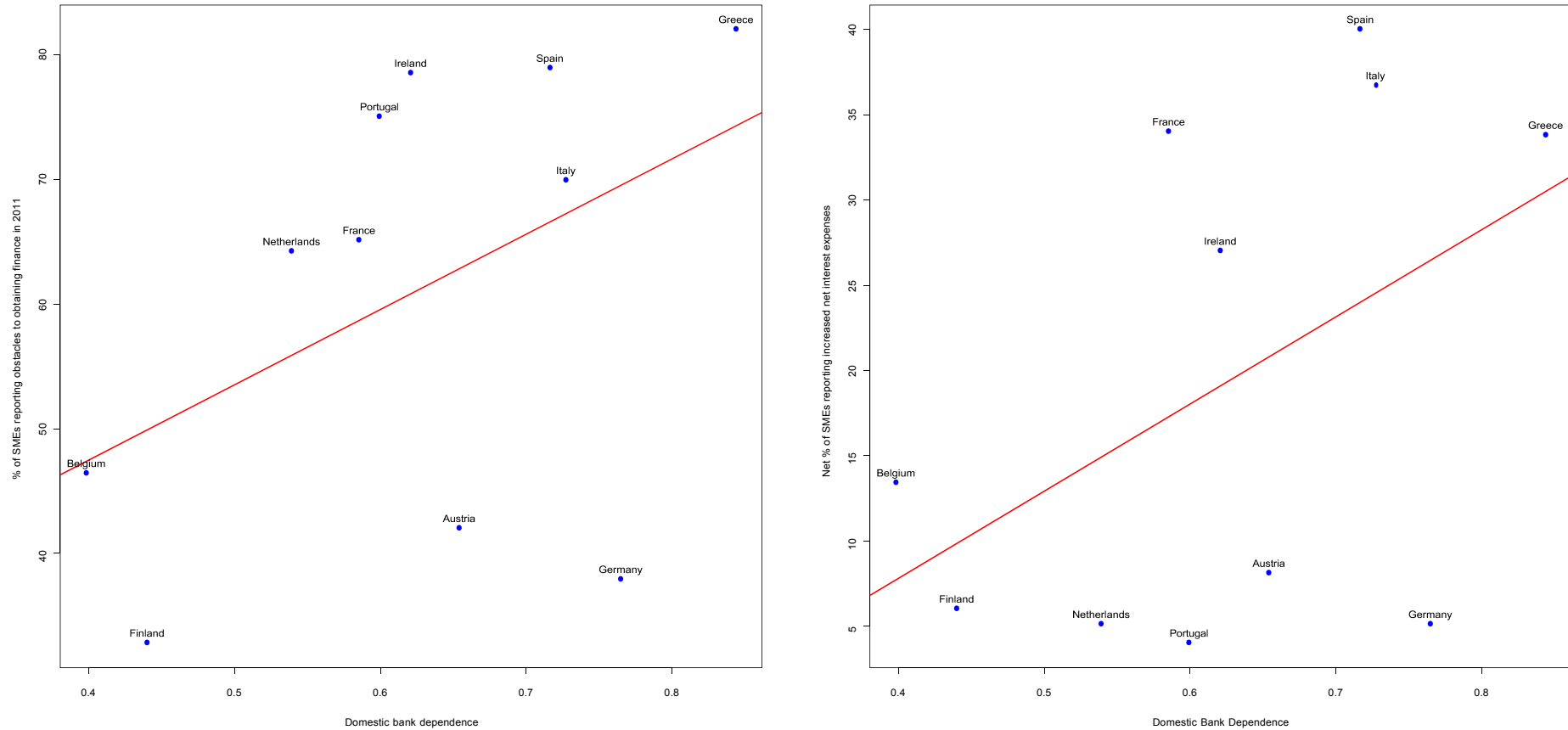
NOTES: The figure conceptualizes the structure of banking integration in the Eurozone in the years before the financial crisis. Cross-border integration mainly took place between banks (bank-to-bank integration) with net flows largely in the direction of the periphery country (big red arrow in the middle). 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



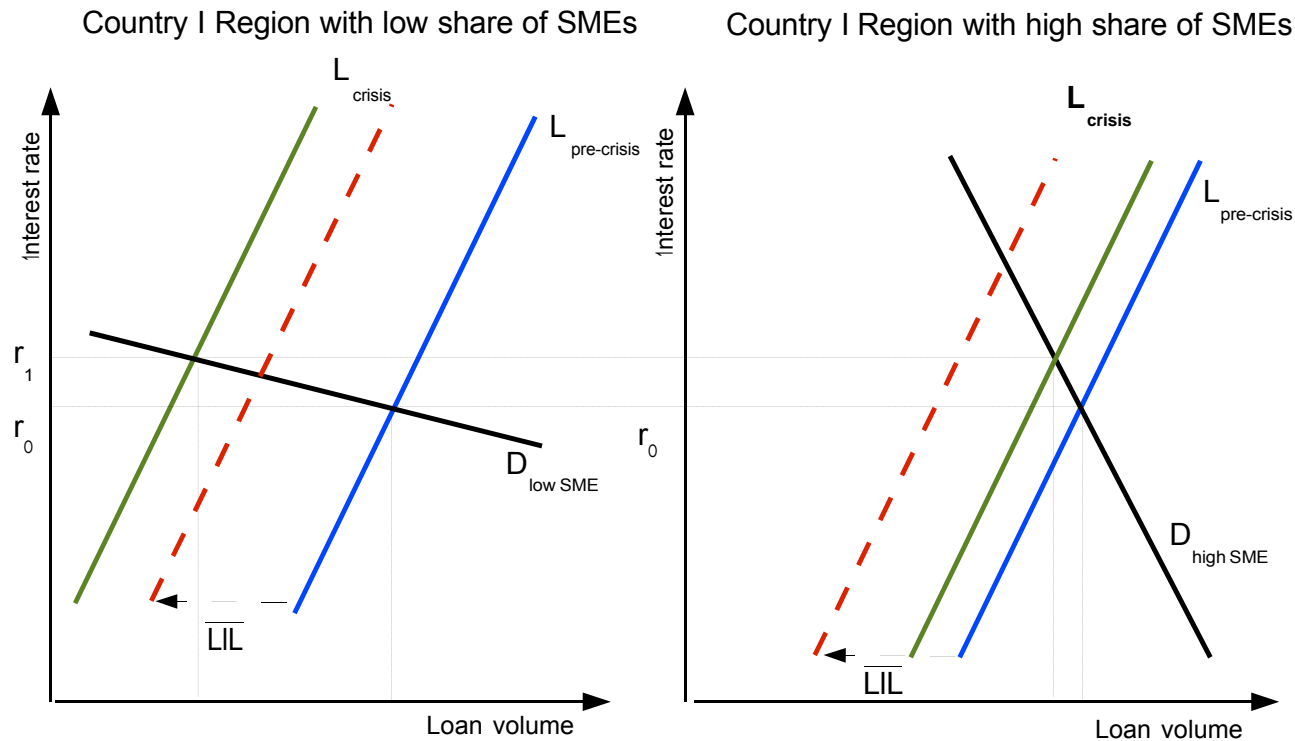
NOTES: The figure reports the fraction of SMEs (firms with fewer than 250 employees) reporting to have used or to be currently using the respective source of external finance. The data source is the survey of access to finance of enterprises (SAFE) 2011 for 11 Eurozone countries.

Figure 4: Domestic bank dependence and post-crisis SME financial conditions



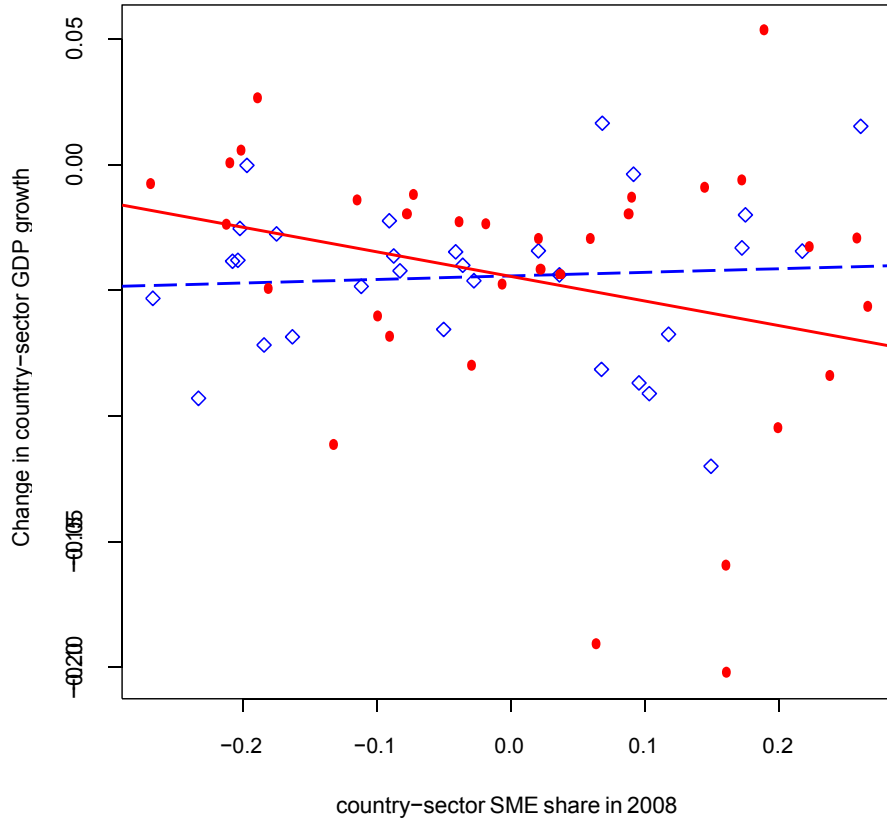
NOTES: The left panel plots the fraction of firms that reported any obstacles in obtaining finance in the ECB-EU Commission's survey of access to finance of enterprises (SAFE) 2011 against our measure of domestic bank dependence, DBD. The right panel plots the difference of the percentage of firms reporting increased interest expenses minus the percentage of firms reporting decreased interest rate expenses as reported in SAFE 2011 against DBD. 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



NOTES: The left panel shows a low-SME-share country, the right one a high-SME-share 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.

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