

The Good Side of Global Banks

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Abstract

In this paper we evaluate whether foreign banks mitigated the credit crunch following the sovereign debt crisis that hit Italy in 2011 based on a sample of about 670,000 bank-firm relationships between December 2010 and December 2011 from the Italian Credit Register. Focusing on firms borrowing from at least two banks and including firm*period fixed effects in all regressions, we are able to control for all firm unobserved heterogeneity. We find that foreign banks tightened credit supply less during the crisis: relative to domestic banks lending by foreign banks grew by about 3 percentage points more, and the interest rate they charged was between 15 and 20 basis points lower after the burst of the sovereign debt crisis. We examine whether the effect was more intense for banks operating as branches or subsidiaries. We also study the extensive margin of credit by analyzing banks' propensity to terminate an existing relationship and to accept a loan application. Finally, we test whether firms were able to compensate the reduction of credit by Italian banks through increased credit from foreign banks, and we find that this was not the case.

Keywords: Credit Supply, Sovereign Debt Crisis, Bank Lending Channel.

Jel Codes: G21, F34, E44, E51

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1 Introduction

Large evidence shows that multinational banks transmit real and financial shocks across countries. Typical patterns indicate that multinational banks hit by a negative shock to liquidity, funding, or capital, reduce cross-border lending and withdraw funds from their branches and subsidiaries located abroad, thus reducing credit supply to other countries. Less is known on the potential role that multinational banks play when operating in countries hit by a country-specific shock. On the one hand, global banks may help absorbing local shocks, as they are more diversified. On the other hand, they may withdraw from a country which is hit by a shock, as a risk reduction strategy.

In this paper we address this question by examining the supply of credit by foreign and domestic banks during the sovereign debt crisis that hit Italy in 2011. This shock represents a particularly interesting case study for two reasons. First, the impact of sovereign tensions on credit supply has been relatively unexplored. Second, it provides a very good experimental laboratory since it affected European economies with asymmetric intensity, thereby constituting a source of heterogeneity across banks headquartered in different countries.

Sovereign crises rarely occur as a stand-alone event. They might be triggered by troubles in the banking sector, which may require government-financed bail outs that weaken public finances. This may, in turn, feedback into worsening of bank balance sheets due to higher sovereign spreads (Acharya et al. 2012). This makes it challenging to use a sovereign shock as a pure credit supply shifter. Moreover, sovereign and banking crises are often accompanied by recessions, when demand for credit typically drops. This poses the additional task of disentangling demand from supply. Finally, firms more affected by the shock may be borrowing mainly from domestic (or foreign) banks, thus raising the issue of controlling for the match between banks and firms.

We address these issues thanks to the way Italy was hit by the sovereign shock and to a unique dataset of bank-firm relationships from the Italian Credit Register. We claim that reverse causality does not affect our estimates given that the shock to Italian sovereign debt was not driven by the conditions of the Italian financial system: Italian banks fared relatively well during the 2007-2008 crisis as compared to their foreign peers ([reference, OECD???]), and there was no specific domestic event that triggered the sharp increase in sovereign spreads (even in expectations).

We are able to distinguish supply from demand and to control for the possibility that domestic banks might lend to firms that are differently affected by the shock, thanks the availability of data at the bank-firm relationship level. Employing an identification

strategy similar to that pioneered by Khwaja and Mian (2008), we restrict our analysis to firms borrowing from at least two banks and plug firm-time fixed effects to absorb all time-varying observed and unobserved firm heterogeneity. This brings us down to a sample of 670,000 bank-firm relationships between December 2010 and December 2011. We split our sample into two periods: a pre-crisis one, going from December 2010 to June 2011, and a crisis one, spanning from July 2011 to December 2011.

We find that foreign banks did not retrench after the sovereign crisis. In fact they mitigated the impact on credit supply that the sovereign crisis exerted for Italian intermediaries, by decreasing credit and increasing its cost significantly less than domestic banks. In particular, we find that the growth of credit granted by domestic banks was about 3 percentage points lower than that of foreign banks. Domestic banks increased interest rates on revolving credit lines and on term loans, respectively, by about 21 and 15 basis points more than foreign banks. We also examine whether Italian and foreign banks behaved differently on the extensive margin of credit after the crisis hit. To this aim, we test whether Italian banks terminated relationships and rejected new loan applications more than foreign banks, as the risk on the Italian sovereign increased. We find that the sovereign debt crisis reduced the willingness of Italian banks to terminate existing relationships, whereas they drastically decreased the probability of accepting new applications. We also test if domestic banks charged higher interest rates on new term loans than foreign banks, and we find that this is the case. Our results are robust to different specifications.

Then we investigate more in depth whether the effect was fully country-specific, or driven by systematic differences between different types of banks over the crisis. First we evaluate whether branches and subsidiaries of foreign banks behaved differently. On the intensive margin we find that Italian banks increased the growth of credit less than subsidiaries of foreign banks, while we find no significant difference in the growth rate of credit granted between domestic banks and branches of foreign banks. By contrast, both subsidiaries and branches appear to increase the cost of credit less than Italian banks. On the extensive margin, we find that the higher probability of cutting relationships for foreign banks is mostly due to the behavior of subsidiaries; on the other hand the rate of acceptance of new loans after the crisis did not differ significantly across the two classes of foreign banks.

Secondly we examine whether bank-specific heterogeneity played a role.

Finally, we test whether firms were able to compensate the reduction of credit by Italian banks through increased credit from foreign banks, by estimating an aggregate effect of the sovereign shock on credit supply to Italian firms. Our results suggest that

firms have not been able to fully substitute credit from domestic banks with credit from foreign banks and the sovereign crisis has therefore had a negative aggregate impact on credit supply.

The paper is structured as follows: the next section examines the related literature, section 3 describes the institutional setting and the development of the crisis, section 4 presents the dataset and the main descriptive statistics, section 5 discusses the empirical strategy, section 6 contains the results of our baseline specification and a set of robustness checks, section 7 examines the extensive margin, section 8 explores whether subsidiaries of foreign banks differ from branches of foreign banks, section 9 presents the result on the aggregate effect, section 10 concludes.

2 Related Literature

Our paper contributes to the literature on global banks and on the international transmission of shocks.

Based on bank-level data from developing countries (Crystal et al., De Haas and van Lelyveld 2006 and 2010), there is scant evidence that foreign banks may help dampening shocks in the host country. Most studies have focussed instead on showing how foreign banks might contribute to “export” tensions affecting their home country, thus highlighting a mechanism of international transmission of shocks. In their seminal papers, Peek and Rosengren (1997, 2000) examine the impact of the fall of Japanese stock prices of the 1990s on cross-border lending by Japanese banks. They show that Japanese bank branches operating in the U.S. tightened their credit supply. Popov and Udell (2010), based on survey data on SME financing on 14 CEE countries in the period 2005-2008, find evidence of international transmission of financial distress in the early stage of the crisis, with Western European banks restricting credit supply more than domestic banks. Cetorelli and Goldberg (2011) show that the transmission of shocks spurred by global banks to emerging economies in the 2007-2009 crisis was large. Using bilateral country-level data they show that the impact occurred not only through contraction of cross-border loan supply by foreign banks and foreign banks’ affiliates, but also by domestic banks that suffered a funding shock due to the reduction of inter-bank cross-border lending. Schnabl (2011) examines the impact that a negative liquidity shock to international banks such as the 1998 Russian default had on credit to Peruvian firms. Using bank-level data, he finds that the impact was significant. The transmission of the shock occurred through foreign inter-bank funding and the effect was strongest for domestic firms that were borrowing internationally. Analyzing data on cross-border syn-

licated lending by 75 banks to 59 countries over the period 2000-2009, De Haas and Van Horen (2011) find that banks that were more severely affected by funding constraints have reduced their lending abroad significantly. Acharya and Schnabl (2010) show that global banking flows are a key determinant of the geographical reach of the 2007-2008 financial crisis. In particular, they argue that the global imbalances explanation of the crisis does not allow to understand why surplus countries have been among the first to be affected. They show that the incentives to invest in asset backed commercial papers conduits and the linkages among banks were key to understand the spread of the crisis. Finally Kalemli-Ozcan et al. (2011) take a more macro perspective and show that during the 2007-2009 crisis the impact of financial integration on output cycles has changed as opposed to the period 1970-2007: whereas before 2007 tighter financial linkages were associated with more divergent output cycles, in more recent years they were correlated with greater synchronization.

Our paper contributes to this literature in several ways. Thanks to our identification strategy, we are able to provide first evidence on the lending policy of foreign banks in a country hit by a shock. In this way, we can test whether foreign banks, relatively more shielded by the shock than domestic banks, contribute to dampen or to amplify the shock. Second, we use very detailed data from the Italian Credit Register, which allows us to fully control for firm unobserved characteristics and for the possibility that the firms borrowing by foreign banks react differently to shocks than firms borrowing from domestic banks. Third, our data allows us to measure several dimensions of credit supply: credit quantity, interest rates, the probability of terminating an existing relationship and that of accepting a loan application. To our knowledge, this is the first work which studies the behavior of domestic and foreign banks across all these characteristics. Fourth, we investigate the behavior of domestic and foreign banks during a sovereign crisis, which represents an important, but relatively unexplored shock. In this respect, our paper is broadly related to Popov and Van Horen (2012) and to Bofondi, Carpinelli and Sette (2012). These papers estimate the effect of higher sovereign spreads on the bank lending channel. Popov and Van Horen (2012) use syndicated loan data at the bank-borrowing country level. Bofondi et al. (2012) use bank-firm relationship level data from the Italian Credit Register.

Our work is also related to the large literature on the activity of foreign banks (see Claessens and Van Horen 2013 for a recent survey). An important finding of this literature is that foreign banks tend to specialize in transaction-based lending, while domestic banks specialize in relationship lending. In particular, Beck et al. (2012) document these differences, but show that domestic and foreign banks cater to the same

clientele. We contribute to this literature by showing that different characteristics of foreign banks affect their behavior in times of crisis.

Finally, from a methodological point of view, our paper relates to the empirical literature on the bank lending channel that uses credit registry data. Khwaja and Mian (2008) study the impact of an unexpected liquidity shock on credit supply on Pakistani data. They find that banks more exposed to the liquidity shock contracted their supply of credit more. Their paper also makes an important methodological contribution since they propose to control for firm-level unobserved characteristics including firm fixed effects. Jimenez, Ongena, Peydrò, Saurina (2011) and (2012) apply a similar technique to identify the banks' balance sheet channel of monetary policy and to study the effect of monetary policy on banks' risk taking.¹

3 The setting

3.1 Foreign banks in Italy

At the end of 2011 there were 101 foreign banks operating in Italy. Of these 24 were subsidiaries, holding 9.3 per cent of total assets. Two subsidiaries of foreign banks belong to the top ten banking groups. Branches of foreign banks amounted to 77 and held 8.2 per cent of system assets. The presence of foreign banks in Italy developed steadily in the past 20 years. Below 4% until 1992 in terms of total assets, it reached 7.9% in 1998, and it was about 17.5% at the end of 2011. On average the share of loans to total assets is particularly high (around 60%) for branches of foreign banks; subsidiaries, with 51%, are more similar to domestic banks, whose share is about 48%.² A significant fraction of the liabilities of branches and subsidiaries of foreign banks is represented by interbank transfers from their headquarters that raise funds either in their home country or in the international wholesale markets (70% for branches and 40% for subsidiaries).

Table 1 shows some descriptive statistics of the loan portfolio and of the number of branches of foreign and Italian banks. The composition of the portfolio of loans to domestic borrowers is different between domestic and foreign banks. The latter hold more overdraft and leasing & factoring loans than domestic banks, whose portfolio is more skewed towards loans to households, and this is reflected in the larger share of

¹Other papers use a broadly similar identification strategy on Italian data: Bonaccorsi and Sette (2012) who study the bank lending channel during the 2007-2008 crisis and Albertazzi and Marchetti (2010) who study the presence of evergreening by banks after the Lehman default.

²The activity of branches of foreign banks tends to be concentrated in lending, given that typically proprietary trading is conducted by the parent company in the home country.

mortgages. As expected, the average share of loans to domestic borrowers is much higher for Italian banks, and they also have a wider network of branches.

The table also shows statistics for foreign banks broken down into branches and subsidiaries. Subsidiaries seem to have a business model more similar to that of domestic banks: one third of their loan portfolio is made of loans to households (17 percent for branches), and they have a larger share of loans to residents (94 per cent as against 81.2). Importantly, the average number of branches is much higher than that of branches.³ The table also suggests a difference between subsidiaries and branches of foreign banks, which we explore in depth in section X.

Table 1 indicates that overall domestic and foreign banks differ along several dimensions, in particular in the composition of their loan portfolio. These differences do not weaken our results as our identification strategy is based on comparing lending by different banks to the same firm, which allows us to fully control for possible differences in the composition of borrowers across domestic and foreign banks. Moreover, firms borrowing from very different types of banks, e.g. a domestic mutual bank, and a large international group, are rare. Last, but not least, we include bank fixed effects in our regressions, so that we can control for all unobserved heterogeneity among lenders, including notably differences in the ex-ante composition of loan portfolios, lending policies, extension of the network of outlets, etc.

3.2 The development of the crisis

During 2010 increasing concerns on the sustainability of public finances in Greece, Ireland and Portugal eventually led these countries to ask for international assistance from the European Union and the International Monetary Fund. Risk premiums on interbank and bond markets rose. Italian banks experienced an increase in the cost of wholesale funding, but their condition was not far from the one of their European peers. The situation changed dramatically from the June 2011, when rapidly deteriorating Greek economic conditions fuelled fears of a Euro-area break-up and triggered contagion to Italy. Between June and July 2011, indeed, S&P downgraded the Greek debt to CCC, the lowest rating for any country it reviews, Greek political instability rose, and announcements of an involvement of the private sector in Greek debt restructuring were made, characterizing it as a "selective default". Fearing that these events might have an impact on Italian sovereign risk, spreads on Italian government debt rose abruptly. Fig. 1 shows the magnitude of the increase in sovereign spreads on the Italian 10 year government bond

³The figure for subsidiaries is higher than that of domestic banks because the averages are not weighted by bank size, and domestic banks include very small banks with a few branches.

with respect to the benchmark 10 year German Bund. All the action is concentrated in the second part of 2011, when spreads increased sharply since June, reaching 370-390 basis points in September 2011 and a peak of 530 basis points in November.

Importantly, there has been no specific event triggering the involvement of Italy into the sovereign debt crisis. The weakness of Italian public finances is in fact driven by the high level of public debt and the low growth rate of the economy, which are both long standing features of the Italian economy (Bank of Italy 2011). Moreover, as opposed to what happened in Ireland or Spain, state aid to the banking sector was extremely limited and did not impact significantly on public deficit (see OECD 2009 among others). Fig. 2 shows primary net borrowing as a percentage of GDP for Greece, Ireland, Italy, Portugal and Spain. Public finances deteriorated markedly since 2008 in Ireland, Spain, Greece and Portugal, also as a consequence of bail-outs of troubled domestic banks. By contrast, primary deficit did not change much in Italy, also because the Italian financial sector needed little support to weather the crisis, and the high level of sovereign debt left little room to use fiscal policy to counteract the recession.⁴ Finally, Italy did not experience a housing bubble.

Overall, it can reasonably be argued that, while Italy was a likely candidate to be hit by the European sovereign crisis, the timing of its involvement could not be anticipated, and the reasons why it happened were not related to the conditions of Italian banks. Therefore, unlike what happened in other European countries, the increase in Italian sovereign yields can not be attributed to the instability of the financial sector.

3.3 The impact of the crisis on banks

An increase in domestic sovereign spreads can affect bank lending through several channels. The first is a higher cost of funding or even difficult access to funding. Funding costs may rise because the asset side of banks becomes riskier, due to holdings of higher-yield sovereign bonds, and due to a likely deterioration of the loans to borrowers that reside in the country hit by the shock. Funding costs also rise because collateralized transactions that are backed by government debt become more expensive, due to higher hair-cut required on the now riskier collateral. Furthermore banks may become more risk averse, as they expect to incur losses on their holdings of sovereign bonds and on their riskier domestic loan portfolio. These factors affect all banks exposed to a country hit by a sovereign shock. Typically though, the impact is much higher for those headquartered in the country hit by the shock, that hold a much larger share of their

⁴Results are qualitatively similar if we use net government borrowing including interest expenses.

home-country sovereign securities and lend mostly to domestic borrowers. For domestic banks additional channels are at work: the transmission of downgrades from sovereign to the banking industry and the potential weakening of the implicit or explicit government guarantee on banks due to strains in public finances, increase funding costs only to domestic banks.

As a consequence domestic banks tend to suffer way more from an increase in the risk of their home country government debt than foreign banks lending to the same country. The variability in the exposure to the shock is indeed country-specific. The CDS spreads on the senior debt of the largest Italian banks rose abruptly leading to increasing difficulties in raising funds in the wholesale markets and rising interest rates on retail funding. The surge in the CDS spread was significantly higher than the one experienced by intermediaries in other developed countries (Fig. 3). Therefore the end of June 2011 can be reasonably identified as the moment in which the Italian banking system was hit by an unanticipated exogenous shock.⁵

4 Data and descriptive statistics

Dataset. We use a unique dataset containing information at the bank-firm relationship level on credit quantities and prices.

We obtain data on individual bank-firm relationships from the Italian Credit Register (CR). This source lists all outstanding loan amounts above 30,000 Euros (less than 40,000 USD) that each borrower (both firms and households) has with banks operating in Italy, including branches and subsidiaries of foreign banks. Intermediaries are required by law to report this information. Data are available at monthly frequency and are of very high quality since intermediaries use the CR as a screening and monitoring device for borrowers.⁶ Loans are distinguished into three classes: revolving credit lines, term loans, and loans backed by account receivables. The dataset includes both granted and drawn amounts. We focus our study on credit granted, as this better captures a decision of bank to supply credit. Drawn credit is influenced by the decision of the borrower to use available lines, and this is largely affected by demand.

We also use information on interest rates charged by a representative sample of

⁵Later developments during 2012 may discount deterioration in banks' access to funding, firms' profitability caused by the recession and government measures taken in the Autumn of 2011.

⁶The CR also contains information on the borrowers' sector of activity (industry, defined at the 4-digit Nace level), location (province), type of business entity (corporations, limited partnerships, general partnerships, sole proprietorships, etc.).

banks (103 Italian banks and 10 branches and subsidiaries of foreign banks) to Italian borrowers. These data are included in a sub-section of the Credit Register (“Taxia database”), and are available at quarterly frequency.

Den consolidated and unconsolidated (in case of stand-alone banks) balance sheets for Italian banks from the Supervisory Reports submitted by the intermediaries to the Bank of Italy, which is in charge of banking supervision in the country. We obtain consolidated balance sheet data for foreign banks from Bankscope.

Finally, data on sovereign yields, which we use to compute spreads, are from Thomson Datastream.

We merge these different data using the unique bank identification number, and the data on sovereign yields using the bank headquarter home country code.

Data on credit quantity and interest rates are collected at December 31, 2010, June 30, 2011 and December 31, 2011. We do not extend our sample beyond December 2011, because on December 22nd the ECB enacted Long Term Refinancing Operations (LTRO), which eased tensions in funding markets, and thus confounded the effect of the sovereign shock. Yet, this may be a period worth studying as future research to assess the effect of the LTRO on credit supply. We do not extend the sample before 2010 to reduce the risk that our results are influenced by other events or developments occurring in previous periods. However, our results are robust to extending the sample to include 2010.

Bank balance sheet information refers to December 31 2010 and to June 30 2011.

Sample. We include all non-financial firms with outstanding credit in the CR, including very small firms, such as sole proprietorships. We exclude firms with bad loans outstanding at the beginning of each period, since these are officially classified as losses and banks will not grant further credit to these firms until the procedure to recover at least part of the outstanding amount is completed.

To control for firm unobservable heterogeneity we select only firms borrowing from at least two banks. Since our identification strategy relies on a comparison between the behavior of foreign and Italian banks lending to the same firm, we select firms that borrow from at least one Italian and one foreign bank. This yields 664,198 bank-firm relationships over the two periods (331,635 in the crisis period and 332,563 in the pre-crisis period), involving 164,470 firm-period couples (82,077 firms in the pre-crisis period, 82,393 in the crisis period, overall 92,620 distinct firms sampled at least in one period). Basic statistics of the firms included in the sample are shown in Column 1 of Table 2. The sample of firms borrowing from at least one domestic and at least one foreign bank is broadly representative of the population of firms with at least two lending relationships

(Column 2 of Table 2). Firms included in our sample are larger (measured by the amount of credit granted), more located in the North of the country, the richest area of Italy where subsidiaries and branches of foreign banks are mostly based, active more in the industrial and agricultural sectors (this mainly reflects the geographical location of firms in the North of the country) than the average firm in the CR that borrows from at least two banks.⁷ Despite being larger than the average firm in the CR, firms in our sample are small. The median total credit granted is around 850,000 euros, the mean is around 6.5 million.

Dependent variables. We compute the log differences in outstanding credit in each bank-firm relationships between June 2011 and December 2010 and between December 2011 and June 2011 to obtain the growth rate of loans in the pre-crisis and in the crisis periods, respectively. We control for mergers and acquisition among banks, so that if a firm had a relationship with a bank, and the bank disappears because it is acquired or merged, we can track whether there is a new relationship with the newly formed bank, or with the acquirer, in which case we consider the relationship as still existing. We aggregate credit at the banking group level, so if a firm borrows from two banks belonging to the same banking group, we consider this as a single relationship. We do so since lending and funding policies are typically decided at the banking group level, and we believe this is the relevant unit of observation to analyze the dynamics of credit supply.

For the same periods we also compute the change in the Annual Percentage Rate (APR) on revolving and term loans. The APR is the actual interest rate paid by firms and is computed by dividing the amounts due (that may be gross or net of fees and commissions) by the products (outstanding amounts multiplied by the days the amount was outstanding). This gives an average annual percentage rate on the loan. Rates on term loans are a less precise measure of cost of credit than rates on revolving credit lines, because they depend on the maturity of the loan, which we do not observe, and also on the collateral posted, since they are typically collateralized. Then, our main results are based on rates on revolving credit lines, and results on term loans provide additional supporting evidence. We choose to use APR net of fees and commissions, because these are typically applied on credit granted while the interest rates we observe are estimated on the basis of the actual usage of the credit line. Then, if a credit line is used for a relatively small amount and for a very short period of time both the flow of interest rates paid and the products are small. As a consequence fees and commissions are large

⁷Focusing on firms with at least two banks is not particularly restrictive, since multiple banking is mainly determined by firm size.

relatively to both interest rates and products leading to extremely large APR. However, for robustness purposes, we also estimate our baseline regressions for interest rates gross of fees and commissions. Our preferred measure of cost of credit is the APR on revolving credit lines.

Descriptive statistics. Descriptive statistics for the three main measures of credit supply we use in the paper are shown in Table 3. Credit contracted, on average, in both periods, but the contraction was larger after the crisis. Interest rates increased more after the crisis than in the pre-crisis period. This is true for both revolving credit lines and for term loans. The former can be renegotiated at short notice by banks, and this explains why in the post-crisis period rates on revolving credit lines grow more than term loans, whose conditions are more stable over time.

The dynamic of both credit granted and interest rates charged by Italian banks has been different from that of foreign banks after the crisis. As shown in Table 4, the growth rate of credit granted by Italian banks dropped from -3.7 to -7.0%, while that by foreign banks stood at -5.5% after the crisis, just 0.3 percentage points less than prior to the crisis. This suggests that the sharp increase in the spread on Italian sovereign debt did not affect the lending supply of foreign banks very much, so that the effect we identify in equation 1 by comparing domestic and foreign banks represents mostly the reaction of the former to the shock.

By the same token, domestic banks increased interest rates sharply during the crisis. Foreign banks also raised rates on revolving credit lines, while those on term loans changed very little. Then, our estimates in equation 2 may represent a lower bound for the full effect the sovereign shock on rates on revolving credit lines.

Of course, this evidence is only suggestive, as firms borrowing from foreign banks may be different from firms borrowing from Italian banks, in terms of lower demand for credit and higher risk. Regression analysis takes care of these possibilities.

Table 5 shows the distribution of bank-firm relationships by home country of the lender. More than a quarter of the relationships are from foreign banks. The majority are French owned. Then, German, American, Austrian, Spanish, Dutch and British banks hold more than 2,000 relationships. Banks from Japan, Switzerland, and Slovenia are less represented. Table 5 also shows the change in the spread of the 10 year sovereign security over the 10 year German Bund, between the average of January and the average of March 2011 for the pre-crisis period, and between the average of July 2011 and the average of September 2011 for the crisis period. It can be seen that this spread increased sharply, by almost 200 basis points, for Italy (see also Figure 1), for Slovenia (110 basis points), Japan and Spain (98 and 83 basis points, respectively). Prior to the crisis,

spreads changed little, and in some instances, they decreased.

Our sample includes 567 banks, 49 of which foreign. Table 7 shows descriptive statistics of the main bank variables distinguishing between Italian and Foreign banks. The statistics are computed over both the crisis and pre-crisis period (data shown in Table ?? indicate that there is little difference across periods). Foreign banks are on average larger, less capitalized, rely more on interbank funding, are less exposed to troubled sovereign securities. The relatively low standard deviation and the small interquartile range of all variables suggest that foreign banks are a more homogeneous group than Italian banks. Larger Italian banks have a balance sheet structure similar to that of foreign banks. In our regressions, systematic differences across banks are controlled by bank fixed effects.

Finally, we describe basic statistics of the relationship-level control variables included in our regressions (Table 6). Banks hold on average one fourth of credit in each relationship. The median share stands at about 17%. Firms draw on average about 64% of available credit, but the median firm draws 74% of it. Finally, overdraft facilities are on average 24% of total credit, 9.1% at the median. Italian banks tend to have a lower share of credit, the ratio of drawn to granted credit is lower for Italian banks, the share of revolving credit lines is higher for Italian banks. The differences in the means of these variables between Italian and foreign banks, while not large in absolute value, are statistically significant. Then, we include these variables as controls in the regression analysis.

5 Empirical strategy

The goal of our paper is identifying a difference in credit supply across domestic and foreign banks using the sovereign crisis as a shock that differentially hit the two categories of banks. To this aim, we need to identify a causal effect of sovereign tensions on credit supply. This poses important challenges.

First, a crucial issue for identification is that sovereign tensions are accompanied by deteriorating economic conditions, inducing firms to scale down their investment plans and decrease demand for credit. Moreover, banks more exposed to sovereign tensions may lend to a different set of firms (e.g. firms with weaker balance sheets, riskier firms, etc.) than banks less exposed to sovereign tensions. Hence, it is critical to properly control for firm level demand for credit, for firms' riskiness, and, more generally, for firm unobserved heterogeneity. The richness of our dataset allows us to do so. Since Italian firms typically resort to multiple lenders (Detragiache et al. 2000, more recently

Gobbi and Sette 2011), we identify the impact of sovereign risk on credit supply by comparing the pre-crisis and the crisis patterns of credit supplied to the same firm by two or more banks that have been affected by the sovereign crisis to different degrees. The inclusion of firm-period fixed effects in all regressions, similarly to what Khwaja and Mian (2008) or Jimenez et al. (2012) do, enables us to control for all firm-level unobserved heterogeneity that affects the dynamics of credit granted and of its cost in each period.

Second, the timing of the shock has to be unexpected: banks should not start cutting credit before the burst of the sovereign crisis, anticipating that they will be hit by the shock, and firms should not adjust their relationships with banks anticipating that some of their lenders will be impaired. As argued in section X, Italian banks fared relatively well during the 2007-2008 crisis as compared to their foreign peers ([reference, OECD???]). Italy did not experience a housing bubble and public support to the financial system has been very limited (Panetta et al. 2010). Both low GDP growth and high public debt are long-standing features of the Italian economy. This clearly made Italy vulnerable to the sovereign crisis. However, the exact timing of the event was unexpected, since no specific internal event triggered the sharp increase in sovereign spreads which occurred in the summer of 2011. This caused an unexpected shock to funding and capital of domestic banks, leaving foreign banks headquartered in European “core countries”, in the US, UK, and Japan relatively unaffected.

To support our identification hypothesis, we run a placebo experiment, using the periods before June 2011 to test whether domestic and foreign banks started to behave differently after the burst of the sovereign crisis. As regards credit quantity, we use data from 2010, setting the fictitious event at June 2010. Then, we add the first half of 2011, and we set the event at June 2010 or at December 2010. In all cases (Table 10) neither the dummy domestic, nor the interaction between the dummy domestic and the dummy post-event are significant. Coefficients are also small in size. As regards the cost of credit, our data start on March 2010. Then, we use the second half of 2010 and the first half of 2011, setting the event at December 2010.⁸ Results for the change in the APR on revolving credit lines are broadly similar to those on quantities, and thus omitted.

Then, we estimate a model in which the observational unit is a credit relationship between a firm and a bank, and we compare two periods, the first half of 2011 (pre-crisis) and the second half of 2011 (crisis). Using a pre-crisis period allows to control for pre-

⁸We also run regressions including the second quarter of 2010, setting the event at June 2010 and nothing changes. However, in this case we compare a 3-month change in the APR between June 2010 and March 2010 with 6-month changes over the following periods.

crisis differences in the supply of credit by Italian and foreign banks. Moreover, it also allows us to include bank fixed effects to control for bank time-invariant unobservables.

The main models we estimate are as follows:

$$\Delta credit_{i,j,t} = \beta_1 domestic_j + \beta_2 domestic_j * crisis_t + \alpha_{i,t} + \varepsilon_{i,j,t} \quad (1)$$

$$\Delta APR_{i,j,t} = \gamma_1 domestic_j + \gamma_2 domestic_j * crisis_t + \alpha_{i,t} + \varepsilon_{i,j,t} \quad (2)$$

where $\Delta credit_{i,j,t}$ is the difference in the log credit granted by bank j to firm i in period t , and $\Delta APR_{i,j,t}$ is the change in the Annual Percentage Rate charged by bank j to revolving credit lines and to term loans granted to firm i in period t ⁹. The dummy *domestic* equals 1 if bank j is Italian, zero if the bank is foreign, either as a branch or a subsidiary. The term *domestic * crisis* is an interaction between the dummy *domestic* and the dummy variable *crisis* which equals 1 in the second half of 2011. We also include a full set of firm-period fixed effects, $\alpha_{i,t}$, which control for firm level unobserved heterogeneity in each period (including firm level demand for credit, firm balance sheet conditions, etc.). These fixed effects also absorb the dummy *crisis*, which therefore does not appear in the equations above. The effect is identified on firms that borrow from at least one Italian and one Foreign bank in at least one period.¹⁰ We also run all regressions including bank fixed effects, which control for all bank time invariant unobserved heterogeneity, including systematic differences in banks' business models, geographical reach, etc.¹¹ Our focus is on the parameters β_2 and γ_2 which capture the differential behavior of Italian banks relative to foreign banks during the crisis.

All regressions also include variables intended to capture the specificity of the relationship between firm i and bank j . The first one is the share of total credit to firm i supplied by bank j (SHARE OF TOTAL CREDIT). Ex ante its expected sign is ambiguous: on the one hand, this variable measures the relative exposure of bank j towards firm i , and this is negatively correlated with loan growth and positively correlated with

⁹The reference rate for loans to non-financial corporations in Italy is the Euribor. In the case of revolving credit lines, this is the 1-month Euribor. Its movements are absorbed by firm*period fixed effects, so that our analysis, at least in the case of revolving credit lines, captures the effects of the sovereign crisis on spreads on loans to non-financial corporations. In the case of term loans, this is made more complicated by the lack of detailed data on the maturity of the loan (we only know whether its maturity is above or below 2 years).

¹⁰Suppose firm 1 borrows from Italian bank A, and Foreign bank B at June 2011. Our identification compares credit growth (and the interest rate changes) between June and December 2011 by bank A and B to the same firm 1. Then, we also add a pre-crisis period (December 2010-June 2011) to take care of possible different dynamics in credit supply by Italian and Foreign banks, but having repeated observations for the same firm-bank pairs is not strictly necessary for identification purposes.

¹¹When we include bank fixed effects they absorb the dummy *domestic*, as no bank changes status (from domestic to foreign or viceversa) in our sample period.

the change in the interest rate; on the other hand it could be interpreted as a proxy of the strength of the bank-firm relationship, therefore suggesting a positive relationship with credit quantities and possibly negative with interest rates. Moreover SHARE OF TOTAL CREDIT can also partially account for the initial size of the loan. The second variable is the share of drawn over credit granted by bank j to firm i (DRAWN OVER GRANTED). This control measures how intensively available credit lines are used. The third variable is the share of overdraft over total granted credit by bank j to firm i (OVERDRAFT). This regressor aims at controlling for the composition of total credit by different types of loan contracts (term loans, overdrafts, loans backed by account receivables).

A key assumption underlying the validity of our identification strategy is that credit growth and the change in interest rate from Italian and foreign banks have a similar trend before the crisis, conditional on all controls.

A first graphical evidence on this assumption can be seen in Figures 4 and 5. Figure 4 shows the 6-month change in the log credit granted by Italian and Foreign banks. While prior to the crisis the two series moved similarly, since June 2011, credit from domestic banks decreased at a much faster rate than credit from foreign banks. Figure 5 shows the change in the Annualized percentage rates on revolving credit lines for domestic and foreign banks. Prior to June 2011, the two series moved together. After the crisis, both Italian and foreign banks raised the cost of credit, but Italian banks did so at a faster pace than foreign banks.

These graphs suggest that before the crisis Italian and foreign banks behaved similarly. However, no adjustment is made for the variability accounted for by the controls included in the regression, and in particular for the different composition of firms borrowing from the two types of banks. Hence, we also show the dynamics of credit granted and of its cost as deviations from firm-period averages. We expect credit from domestic and foreign banks, net of firm effects, to move similarly until June 2011, and to start diverging afterwards. This is precisely what happens, as shown in figure 6. Likewise, divergence in the patterns of cost of credit occurs after June 2011, as shown in figure 7. These are the graphical counterparts of equations 1 and 2 (see also Khwaja and Mian 2008 for a similar representation of the data). The placebo experiment shown in Table X also provides a formal test of the common trend assumption, suggesting that prior to June 2011, credit supply from domestic and foreign banks was not different.

It is important to keep in mind that all our regressions also include bank fixed effects, hence we are already controlling for bank-specific time-invariant trends. The requirement for a common trend then only applies to how much Italian and foreign banks' trends

depart from their time-invariant component before and after the crisis.

6 Baseline model

6.1 Credit quantity

Results from the estimation of equation 1 are displayed in table 8.¹²

Columns 1 and 2 show the effect of the dummy *domestic* on the growth of credit granted. Before the crisis there is no difference between Italian and foreign banks. During the crisis, the behavior of the two types of banks is in fact different: credit granted by Italian banks grew by about 3 percentage points less than credit granted by foreign banks. This is an economically significant effect: These results are robust to the inclusion of bank fixed effects (column 2), which absorb the dummy *domestic*. Bank fixed effects control for differences in bank balance sheet structure¹³ (bank's balance sheet structure did not change much between December 2010 and June 2011), bank organizational structure, and other bank-level time invariant unobserved heterogeneity, including bank-specific trends in loan growth. Yet we do not observe much difference in the coefficients in the two specifications, and this suggests that the "domestic bank" variable of column 1 is already accounting for most of the cross-sectional heterogeneity across banks.

The coefficient of the share of credit held by the bank is negative and significant, suggesting that banks might reduce lending more intensively to firms towards firms they were initially more exposed to. The coefficient of the ratio of drawn to granted credit is positive, but statistically significant only when bank-fixed effects are included. This control is especially important, as it captures the extent to which available credit lines can be drawn. In that, it helps controlling for relation-specific demand. The coefficient of the share of overdraft loans is positive and significant. We included this variable to control for the composition of loans in each bank-firm relationship, and we do not have any prior about its effect on credit growth.

6.2 Interest rates

We now move to study the impact of the sovereign crisis on the cost of credit, by comparing the behavior of foreign and Italian banks in the pricing of loans, estimating

¹²We double cluster standard errors at the bank and at the firm level.

¹³The inclusion of bank fixed effects allows us to totally control for time invariant differences in bank characteristics, such as the riskiness or sectoral concentration of bank loan portfolios.

equation 2.

Table 9 shows results of regressions on the change in the Annual Percentage Rate (net of fees and commissions) on revolving credit lines in columns 1 and 2 and on term loans in columns 3 and 4, without and with bank fixed effects, respectively. Domestic banks increased rates on revolving credit lines by about 20 basis points more than foreign bank lending to the same firm. The size of the coefficient of the interaction *domestic*crisis* changes very little if bank fixed effects are included. We run the same regression on the change in interest rates on term loans. Domestic banks increased rates on term loans by about 15 basis points more than foreign banks lending to the same firm. Interestingly, the dummy *domestic* is not significant neither in regressions on the change in rates on revolving credit lines, nor on the change in rates on term loans, indicating that prior to the crisis, domestic and foreign banks did not price credit differently. Overall, these results indicate that after the crisis Italian banks increased the price of credit more than foreign banks.

Regarding relationship-level controls, the share of credit held by the bank is not statistically significant. By contrast, the share of credit granted by the bank as revolving credit lines is positive and significant. This captures the extent of bank's unsecured exposure to the firm, and this explains the positive sign of the control. Finally, the ratio of drawn to granted credit is also significant, although this has different sign in regressions on revolving credit lines (positive) with respect to those on term loans (negative). This has to do with the fact that regressions on the change in interest rates are conditional on credit being granted to the firm. Then, if a firm is already using extensively its available credit, it may obtain further term loans posting collateral, which yields lower rates; if instead it obtains revolving credit lines (unsecured) it faces higher rates.

6.3 Robustness

6.3.1 Alternative specifications and samples

We perform a series of checks to test the robustness of our main results.

First, we use credit drawn as an alternative measure of credit growth. Credit drawn is much more affected by firm demand for credit than credit granted. Even including firm-period fixed effects, credit drawn still partly reflects a decision of the firm, rather than a supply-side (bank) decision. Results are shown in columns 3 and 4 of Table 8. Overall, credit is drawn less intensely from domestic banks, providing a picture consistent to the one coming from the analysis of credit granted.

Second, we also estimate the baseline regressions on Annual Percentage Rates gross of

fees and commissions. These are an important component of the cost of credit. Results are shown in Table 11.¹⁴ It can be seen that estimates are essentially unchanged: the coefficient of the dummy Italian banks interacted with the dummy crisis in the regression on the gross APR on revolving credit lines is larger, since revolving credit lines are particularly prone to the effect of peaks of usage, which determine very large effective gross rates in our data. The coefficient of the dummy *domestic*, interacted with the dummy crisis, in the regression on the gross APR on term loans is instead similar to that of the regressions on the net APR.

We perform some additional robustness checks (not shown in the paper to contain its length, but available from the authors): we estimate the models excluding Spanish banks since these have also been affected by the crisis¹⁵; we trim or winsorize the change in log credit when it is above or below the 1st and 99th percentile; we estimate the models excluding the relationship level controls since these may be correlated with previous period growth of credit. In all cases results continue to hold.

Finally, we use a continuous measure of banks' exposure to sovereign tensions:

$$\Delta credit_{i,j} = \beta_1 \Delta spread_j + \alpha_i + \varepsilon_{i,j} \quad (3)$$

$$\Delta APR_{i,j} = \gamma_1 \Delta spread_j + \alpha_i + \varepsilon_{i,j} \quad (4)$$

where $\Delta spread$ is the change in the spread with the German Bund on the 10 year sovereign securities of the country in which bank j is headquartered.¹⁶ For this purpose we limit our attention to the June - December 2011 period. To identify the impact of a change in the sovereign risk premia it is indeed more useful to exploit the cross-sectional variation of the delta spread during the crisis. Our focus is on the parameters β_1 and γ_1 , which capture the elasticity of lending and interest rates to increased home-country sovereign risk. This exercise is also useful to take care of the possibility that foreign banks react to the shock: this model estimates the effect of an increase in banks' home country spread on credit supply, and it amounts to compare the behavior of banks hit by shocks of different intensity.

¹⁴The change in the gross APRs on revolving credit lines is winsorized at the 5th-95th percentile: these correspond to -33.8 and 27.0 percent. The change in the gross APRs on term loans is winsorized at the 1th-99th percentile: these correspond to -1.92 and 3.25 percent.

¹⁵In the second half of 2011, the increase in the delta-spread of Spanish sovereign securities was much smaller than the corresponding rise on the Italian Btp, as Table 3 shows.

¹⁶This is computed as the difference between the monthly average of September 2011 and the monthly average of June 2011. We do so in order to avoid possible endogeneity issues, as the burst of the sovereign debt crisis occurred during the third quarter of 2011, and later developments may have been affected by the worsening of the business cycle, at least in Italy.

Results are shown in Table 12 and are consistent with those found with the baseline model. A 100 basis points increase in the spread leads to a 1.3 percentage points lower credit growth. This is a sizable effect, as the mean log change in credit is -6.7 per cent. The same increase in spread leads to interest rates higher by 16 and 11 basis points for revolving credit lines and term loans, respectively.

Importantly, the model predicts that the increase in the Italian sovereign spreads between July and September (192 basis points) leads to a lower credit supply by -2.5 percentage points, and to a raise in rates on revolving credit lines and term loans by 31 and 20 basis points, respectively. These effects are very similar to those estimated in the baseline model. This suggests that the estimates of the baseline model are very close to the full effect of a rise in sovereign spreads on credit supply, and the effect of the shock on foreign banks, less affected (the “control” group) is very limited. Perhaps, only the effect on the change in rates on revolving credit lines is underestimated by the baseline model.

We also estimate the above model on our initial panel, including the pre-crisis period and bank fixed effects, and results are unchanged.

6.3.2 Alternative explanations

We also perform some checks to ensure that our results are not driven by spurious effects related to bank heterogeneity: while large domestic banks have a more similar business model as foreign banks, smaller banks, especially mutual banks are very different from other banks. Our results may in principle be capturing a different impact of the crisis on smaller banks. To address this possibility we run all regressions on the sample of foreign banks and of the 20¹⁷ largest Italian banks by total assets: all results hold and statistical significance actually increases.

We also check that our results are not driven by bank characteristics that might have changed over time with a different extent across Italian and foreign banks. Hence, we test whether our result on credit tightening by Italian banks compared to foreign ones holds even including bank balance-sheet characteristics in our baseline equations. This should take into account the possibility that our results on the interaction domestic*crisis are due to a spurious correlation between being a foreign bank and having a balance-sheet structure changing over time. In particular, we include bank capitalization (the Tier 1 ratio), bank size, the ratio of sovereign securities from European troubled countries (GIIPS) to total assets, and the ratio between wholesale funding and total assets. The

¹⁷We tried different thresholds and results are unchanged.

last two variables are especially important because they capture the extent to which banks might be affected by the sovereign crisis. The higher the exposure to European "peripheral" countries, the higher the losses banks recorded in their balance sheets, and the more the cost of funding increased, as fears mounted that banks could face large losses. However, portfolio holdings of government bonds constitutes a form of collateral available for refinancing from the central banks, and for collateralized interbank borrowing. Wholesale funding is the most volatile source of funding, and it dried-up sharply in the second half of 2011.

Results, shown in Table ??, indicates that the interaction remains significant and negative in the regression on credit quantity growth and significant and positive in the regression for the change in the interest rates on revolving credit lines.¹⁸ This means that, even if they had the same capital position and funding structure at the onset of the crisis of foreign banks, Italian banks would still be restricting credit more after the crisis burst: there appears to be a country-specific effect common to all Italian banks.

A further possibility is that results are driven by a bank-specific demand for credit. We believe this is not the case. First, we control for several relation-specific variables: the share of total credit to the firm held by the bank, the ratio of drawn to granted credit, the composition of the loans granted within the credit relationship.¹⁹ Second, the combination of our results on prices and interest rates is not consistent with a demand-driven story. If credit quantity increases because firms demand more credit from foreign banks, we should observe that the price of credit goes up as well. We find the opposite: foreign banks, those relatively less affected by the shock, grant more credit and raise interest rates less which is consistent with a supply story.

7 The extensive margin of lending

The extent to which banks decide to terminate existing relationships and to start new relationships are important determinants of borrowers' access to credit. When an existing relationship is cut, borrowers may need to look for alternative funding sources or scale down investment. When a new relationship is started, borrowers get a significant boost in their access to credit; moreover, this may represent a positive signal of borrower's ability to stay in business for other financiers, suppliers and customers.

As an additional extension, we study whether the sovereign debt crisis also affected

¹⁸For term loans, the interaction is not significant, although still positive.

¹⁹These are important characteristics of credit relationships, and no other paper, working on Credit Register data, included all these controls.

the propensity of banks to terminate relationships and to accept applications for new loans. We also study whether the sovereign debt crisis affected the interest rates charged on new term loans.

As a first step, we estimate equations for the probability that a relationship is terminated. To this aim, we define a dummy variable taking value 1 if a bank-borrower relationship had positive credit granted only at the beginning of the period and value 0 if credit granted was positive at both periods. We compare the probabilities that a foreign and an Italian bank terminate a relationship with the same firm, by estimating a linear probability model which allows to include firm-period fixed effects. Table 13 shows that domestic banks are less likely to cut credit than foreign banks (columns 1 and 2, the latter includes bank fixed effects). Italian banks are about 1.6 percentage points less likely to terminate a relationship than foreign banks after the sovereign crisis started (on average about 7.5 percent of the relationships in place at June 2011 have been terminated by December 2011).

As a second step we examine the “extensive margin” of credit, in particular whether Italian and foreign banks were more, less, or equally likely to grant loans to new clients. In line with Jimenez *et al.* (2012), we use data on loan applications recorded in the CR in order to analyze the probability of acceptance/refusal of new credit. Every time a bank requests information on a borrower, the query is recorded in the CR, together with the motivation of the request, typically a loan application by a new client. This allows us to recover the number of applications for a loan made by each borrower to each bank in every period. We collect data on all the requests recorded between October 2010 and March 2011 and between July 2011 and December 2011, pre-crisis and crisis period, respectively. For each application we check if the bank granted any credit to the loan applicant in the sample period and in the following three months. Hence, a loan application submitted to a bank, say, in December 2010, is classified as accepted if we observe that the bank grants credit to the borrower in any point in time between the time of the request and March 2011. Our dependent variable is a dummy equal to 1 if the application of firm j to bank i is accepted, 0 otherwise. A stand-out descriptive feature of the frequency of accepted applications is that overall it has sharply dropped during the crisis, to 9 per cent between June 2011 and March 2012 from the 37 per cent observed in the three previous quarters.

We estimate a linear probability model. We also include firm fixed effects in some specifications to fully control for firm heterogeneity. However, this may induce a selection bias since the effect is identified on firms that make loan applications to at least two banks over a relatively limited period. The reason for applying twice might precisely be that

the first application has been denied. Results are shown in columns 3 and 4 of Table 13. All regressions include bank fixed effects. Column 3 shows results without firm-period fixed effects, thus including also firms that make only one loan application in each period. Column 4 include firm-period effects, and the analysis is done on firms that made loan applications to at least two different banks in each period.²⁰ Results indicate that after the crisis the willingness to accept a loan application by Italian banks decreased more than that of foreign banks. An inspection of descriptive statistics suggests that the effect comes from foreign banks remaining equally selective in accepting loan applications over time and Italian banks becoming way more selective after the sovereign crisis burst.²¹

The combination of the results for credit growth, for the probability that a relationship is terminated, and for the probability that a new loan is accepted provides an elaborate picture. Foreign banks, those that were less affected from increases in sovereign spreads, are more aggressive in cutting credit relationships and, furthermore, before the crisis they were less likely to accept a loan application than Italian banks. However, conditional on relationships being in place, foreign banks provide more credit than Italian banks. This suggests that foreign banks became more selective with their borrowers, yet once they have established a relationship they support their borrowers more. Possibly foreign banks have a tougher budget constraint than Italian banks, and are more able to cut more fragile relationships. This finding can be interpreted in the perspective of relationship lending: since foreign banks have stepped into the Italian market only in the second half of the 2000s, they have had relatively less opportunities to develop long-term bank-firm relationships. This possibility is in line with the results of De Haas and Van Horen (2012), who show that after Lehman's default, foreign banks continued to lend more to countries where they have longer lending experience.

As a last step, we study whether domestic and foreign banks charged different interest rates on new term loans. We use the data included in the Taxia dataset on the Annual Percentage Rates gross of fees and commissions charged on new term loans. In this case, we study the level of interest rates, and not the change, since these data are relative to specific loans, and not to outstanding balances. To avoid the possible influence of seasonal effects, we compare the level of interest rates charged on loans granted in the fourth quarter of 2011 with those granted in the fourth quarter of 2010. Results are

²⁰In this case identification is achieved thanks to firms applying for a loan to at least one foreign and at least one Italian bank in each period.

²¹This is corroborated by regressions excluding bank fixed effects, but including a dummy for domestic banks: the latter is positive and significant, indicating that domestic banks were more likely to accept a loan application than foreign banks in the pre-crisis period. After the crisis this gap was filled because Italian banks reduced significantly their willingness to accept a new loan application.

shown in column 5 and 6 of Table 13. Column 5 does not include firm fixed effects, and thus include all term loans granted. Column 6 includes firm-period fixed effect and thus is estimated on the subsample of firms that obtain two new term loans in a quarter. Results indicate that the interests charged by domestic banks on new term loans have been about 35 basis points higher than those charged by foreign banks. This is consistent with the results we found in the regressions on the change in the cost of existing loans. The other controls behave as expected: the dummy crisis is positive and highly significant, indicating that interest rates on new term loans increased during the crisis (the effect is large, about 130 basis points, although this is not a pure supply effect). The size of the loan is significant only in the regression that does not include firm-period effect. Therefore, it likely proxies for the size of the firm. The negative sign of its coefficient thus indicates that larger firms are charged lower rates.

8 Subsidiaries and branches of foreign banks

To shed more light on our results we test whether the behavior of foreign banks differs according to the way they operate in Italy. As a first step, we distinguish between branches and subsidiaries. While subsidiaries are very similar to domestic banks in terms of extension of their network of outlets and business model, branches often are specialized in specific market segments (e.g. syndicated loans, leasing, etc.), and concentrate their activity in certain areas of the country. Subsidiaries and branches also differ in the way they obtain funding. Branches typically obtain most of their funding as transfers from the headquarter, while subsidiaries rely relatively more on retail funding. [references, say that the distinction is relevant: cetorelli-goldberg aer p&p, beck et al]

Table ?? shows results of regressions that distinguish foreign banks into branches and subsidiaries by including a dummy for each category and interacts both dummies with the dummy crisis.²² Columns 1 to 3 display results from regressions on the intensive margin of credit (quantities and interest rates). Results show that subsidiaries have been reducing credit and raising rates less than domestic banks. For branches we do not find a significant difference relative to domestic banks, but for the interest rates on revolving credit lines.²³ [provare spiegazione]

²²This way the excluded category is that of domestic banks during the crisis. We also estimated the model running two separate regressions on the sub-sample of firms borrowing from at least one domestic bank and at least one subsidiary and the one of those borrowing from at least one domestic bank and at least one branch. Results are unchanged.

²³Nevertheless the coefficient on the interaction branch*crisis is larger than the one on subsidiary*crisis, though they are not statistically different.

Columns 4 to 8 display results from regressions on the extensive margin. Column 4 shows estimates from a regression on the probability that a relationship is terminated. It can be seen that, relative to domestic banks, both branches and subsidiaries are more likely to terminate a relationship. XXX Columns 5 and 6 show results from regressions on the probability that a loan application is accepted. The sample used in column 5 includes all applicants, that used in column 6 includes only applicants that made at least two applications to one Italian and one foreign bank in the period. In the latter case, regressions include firm-period fixed effects. Results indicate that both subsidiaries and branches have been more likely than Italian banks to accept loan applications after the crisis. The probability of acceptance is similar across the two types of foreign banks. Finally, columns 7 and 8 show regressions on the level of interest rates on new loans. Subsidiaries raised rates less than domestic banks after the crisis, while branches did not behave differently from domestic banks.

Overall these results suggest that the effect we find in the baseline regression on the growth of credit granted is mainly driven by a different behavior of Italian banks relative to subsidiaries of foreign banks. By contrast, we find a smaller difference between domestic banks and branches of foreign banks, despite the fact that the latter enjoy better access to funding than domestic banks. We interpret these results as evidence that the type of presence in the Italian market is relevant for the decision about the quantity of credit granted. Subsidiaries of foreign banks have a more extensive network of outlets and have therefore the possibility to collect more soft information on borrowers than branches of foreign banks. This evidence is consistent with the possibility that subsidiaries can more fully exploit the advantage of accessing cheaper funding and having stronger balance sheet, thanks to the possibility to rely more on relationship lending than branches.

To further explore these results, we run regressions interacting the dummy foreign (or separately the dummies branch and subsidiary) with firm characteristics (size, leverage, profitability) obtained by firm balance sheets at December 2010. We find little evidence of heterogeneous effects. This may be due to the fact that our sample of firms borrowing from at least one domestic and at least one foreign bank is relatively homogeneous. It may also be due to the fact that balance sheet data at December 2010 may contain little information on how the conditions of the firm evolved after the crisis.

9 The aggregate effect

The empirical analysis discussed so far shows that domestic banks contracted credit growth and increased the cost of credit more than foreign banks after the burst of the sovereign debt crisis. These results are based on coefficients estimated comparing the behaviour of a domestic and a foreign bank lending to the same borrower (“within”), and therefore reflect partial equilibrium outcomes. However, firms might compensate the reduction in credit from domestic banks with increased loans from foreign banks that were not directly hit by the sovereign debt crisis.

Estimates from a simple firm-level regression is likely to be biased, though, because changes in the log of total credit at the firm level also reflect firm-level demand for credit, changes in firm financial strength, etc. A method to estimate the unbiased firm-level (“aggregate”) impact of the supply shock induced by the crisis on the growth of credit commitments has recently been proposed by Jimenez et al. (2010). However, their methodology does not allow to easily obtain standard errors of the firm-level effects, and thus to conduct inference. In this paper, we use an alternative estimation procedure.²⁴ We first estimate firm-fixed effects from our base model at the bank-firm level. Then we plug these estimates of firm effects in a firm-level equation in which the dependent variable is the growth of total credit granted to firms by banks (including new relationships) and bank balance sheet controls are computed as averages weighted by the initial credit granted. Standard errors are estimated by block-bootstrapping at the bank level, to take into account the fact that firm fixed effects are estimated regressors.²⁵

Formally, from the base model (equation 1), we obtain an estimate of firm-period fixed effect $\hat{\alpha}_{i,t}$. As a second step we estimate

$$\Delta credit_{i,t} = \beta_1 \overline{domestic}_i + \beta_2 \overline{domestic}_i * crisis_t + \hat{\alpha}_{i,t} + \varepsilon_{i,t}$$

where $\overline{domestic}_i$ is the average at the firm level of the dummy *domestic* weighted by the share of credit to the firm held by each bank. A more thorough description of this approach can be found in the Appendix.

Results are shown in Table 14. Column 1 shows results without the estimated firm effects. The interaction term between the dummy domestic and the dummy crisis is negative and significant. This indicates that firms are not able to fully substitute credit

²⁴A first version of this methodology appears in the June 2012 version of Bonaccorsi di Patti and Sette (2012).

²⁵This approach is similar in spirit to that proposed by Abowd, Kramarz and Margolis (1999) to estimate worker effects in their study of wage premia.

from domestic banks by increasing credit from foreign banks. However, as argued above, this result is likely biased. In column 2 we show estimates including the firm effect. Now, the dummy domestic is still negative and significant, although the size of the coefficient is smaller. This suggests that when taking into account firm unobservables, including firm-level demand for credit, the supply effect is smaller. It is nevertheless still large: if the share of credit a firm obtained before the crisis from domestic banks increases by one standard deviation (12 percentage points), credit growth after the crisis is about 0.4 percentage points lower. This is large as the median credit growth in the crisis period is -3.1 percent (the mean is -4.8 percent).

We also computed the aggregate effect on the basis of the methodology proposed by Jimenez et al. (2010). In this case, the coefficient of the dummy domestic bank is -0.042. The coefficient estimated through our two-step approach, -0.033, is not statistically different from this value.

Finally, the estimated firm fixed effect is highly significant and positive, indicating that this is likely capturing firm-level demand for credit.

These results suggest that firms have not been able to fully substitute credit from domestic banks with more credit from foreign banks, and the sovereign crisis has therefore had an aggregate impact on credit supply.

10 Concluding remarks

In this paper, we study the lending supply of domestic and foreign banks operating in Italy during the recent sovereign debt crisis which hit the country. We study quantities lent, interest rates charged, willingness to accept new applications and to terminate existing relationships over the transition between the pre-crisis and the crisis periods.

Our results show that Italian banks, more hardly hit by the shock than foreign banks, tightened their supply of credit after the sovereign crisis burst, both in terms of quantities and prices. Lending by Italian banks grew by 3 percentage points less and the interest rates charged were 15 to 20 basis points higher with respect to foreign banks operating in Italy. Our estimates fully control for firm unobserved heterogeneity, by including firm-time fixed effects, and also hold when capturing bank unobserved heterogeneity through bank fixed effects.

We also analyze whether firms have been able to fully substitute for the decrease in lending of Italian banks during the crisis by increasing lending by foreign banks, thus keeping firms' access to credit substantially shielded from sovereign tensions. We find that in fact this was not the case: substitution was not complete and therefore the

sovereign crisis exerted a significant aggregate effect on credit supply.

We test our results across a wide set of robustness checks. In particular we find that the difference between Italian and foreign banks does not seem to be due to differences in banks balance sheet characteristics. We also find that Italian banks increased the growth of credit less than subsidiaries of foreign banks. By contrast, we find no significant difference in credit granted between domestic banks and branches of foreign banks, despite the fact that the latter enjoy better access to funding than domestic banks. By contrast, both subsidiaries and branches, appear to increase the cost of credit less than Italian banks.

Besides analyzing the terms of existing credit relationships, our investigation also explores the differential behavior of Italian and foreign banks in accepting new loan applications and terminating existing relationships as the sovereign crisis burst. These results are particularly insightful, as they show that foreign banks, while tightening credit less with respect to Italian banks, did not relax their selectivity criteria during the crisis; if any, they increased it, being more likely to cut credit and maintaining very high rejection rates. An interpretation of this finding could be that foreign banks "flew to quality" during the crisis, by concentrating on supporting less fragile borrowers. This story suggests an examination of firms' characteristics, which we intend to pursue as a further extension of our work, by studying whether foreign and Italian banks behave differently depending on firms' riskiness (z-score, leverage, profits), liquidity, and opacity (size, age, tangible to total assets).

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A Appendix

A.1 Derivation of the aggregate effect

The relationship level equation is the following

$$\Delta credit_{i,j,t} = \beta_1 domestic_j + \beta_2 domestic_j * crisis_t + \alpha_{i,t} + \varepsilon_{i,j,t}$$

where $\Delta credit_{i,j,t}$ is the growth rate of credit to firm i by bank j at time t . Then, we take the average of both sides of this equation weighted by the share of credit held by each bank as follows:

$$\begin{aligned} \sum_{j=1}^{n_i} \Delta credit_{i,j,t} * \frac{credit_{j,t}}{\sum_{j=1}^{n_i} \Delta credit_{i,j,t}} &= \beta \sum_{j=1}^{n_i} domestic_j * \frac{credit_{j,t}}{\sum_{j=1}^{n_i} \Delta credit_{i,j,t}} + \\ \beta \sum_{j=1}^{n_i} domestic_j * crisis_t * \frac{credit_{j,t}}{\sum_{j=1}^{n_i} \Delta credit_{i,j,t}} &+ \sum_{j=1}^{n_i} \frac{credit_{j,t}}{\sum_{j=1}^{n_i} \Delta credit_{i,j,t}} \alpha_{i,t} + \sum_{j=1}^{n_i} \frac{credit_{j,t}}{\sum_{j=1}^{n_i} \Delta credit_{i,j,t}} \varepsilon_{i,j,t} \end{aligned}$$

where $\sum_{j=1}^{n_i} \frac{credit_{j,t}}{\sum_{j=1}^{n_i} \Delta credit_{i,j,t}} = 1$. Simple algebra shows that the left hand side is the growth rate of total credit obtained by firm i at time t . Then this yields:

$$\Delta credit_{i,t} = \beta_1 \overline{domestic_i} + \beta_2 \overline{domestic_i} * crisis_t + \hat{\alpha}_{i,t} + \nu_{i,t}$$

which is the equation for the growth of credit at the firm level we are interested to estimate. To obtain the $\hat{\alpha}_{i,t}$ we estimate them from the relationship-level equation. These estimates are unbiased and consistent as the number of banks increases (provided that the number of firms does not go to infinity). As the $\hat{\alpha}_{i,t}$ are estimated in the relationship level equation, standard errors need to be estimated by bootstrapping to obtain correct estimates of the variance-covariance matrix. This equation is exactly valid for the growth rate of credit. We approximate it by the log change in credit, in the estimation.

To estimate the full aggregate effect, we also take into account that part of the growth of credit is due to the starting of new credit relationships. Our approach is valid as long as the firm-specific effect is the same for old as for new relationships, possibly up to a noise term uncorrelated with both the other regressors and the firm effect. This is reasonably true for firm-specific characteristics such as firm riskiness. It must also

be true for firm demand for credit, which must not be bank specific. This, however, is an identifying assumption that must hold throughout our analysis, also when we study credit supply at the bank-firm relationship level.

A.2 Tables and figures

Table 1: Descriptive statistics of Domestic and Foreign banks

	Domestic	Foreign	Subsidiaries	Branches
Short term/Total Domestic Loans	31.9	13.3	19.1	11.0
Overdraft/Total Domestic Loans	1.7	4.1	6.0	3.4
Mortgages/Total Domestic Loans	60.1	21.3	31.9	17.3
Leasing&Factoring/Total Domestic Loans	0.6	9.7	7.6	10.4
Loans to Households/Total Domestic Loans	32.8	22.2	34.2	17.6
Loans to Firms/Total Domestic Loans	63.8	66.9	50.2	73.2
Domestic Loans/Total Loans	99.3	85.2	94.1	81.2
Average number of branches in Italy	58.9	44.3	142.8	6.9

Table 2: Descriptive Statistics of Firms in the sample

	Sample Firms	Other firms in the CR (with more than 1 bank)
Credit Granted - Median - December 2011 (euros)	870,470	417,485
Credit Granted - Median - June 2011 (euros)	814,225	403,644
Number of banks - December 2011	4.02	2.68
Number of banks - June 2011	4.05	2.68
Sector (percent of firms)		
Agriculture	8.31	5.20
Construction	11.59	14.25
Energy	0.56	0.43
Industry	29.28	27.82
Service	50.27	52.30
Area (percent of firms)		
North	62.97	59.22
Center	18.21	22.30
South	18.83	18.48

Table 3: Descriptive Statistics of Main Dependent Variables

	Mean	Median	p25	p75	StdDev	N Obs
6-month log changes						
Δ Log Credit	-0.054	0	-0.086	0	0.422	664,198
Δ Log Credit - Pre crisis	-0.041	0	-0.081	0	0.412	332,563
Δ Log Credit - Crisis	-0.066	0	-0.092	0	0.431	331,635
6-month changes, percentage points						
Δ APR - Revolving	0.61	0.54	0.08	1.12	1.40	203,042
Δ APR - Revolving - Pre crisis	0.40	0.40	0.00	0.86	1.35	100,791
Δ APR - Revolving - Crisis	0.82	0.77	0.22	1.37	1.40	102,251
6-month changes, percentage points						
Δ APR - Term Loans	0.39	0.33	0.17	0.50	0.63	134,323
Δ APR - Term Loans - Pre crisis	0.33	0.31	0.18	0.42	0.53	66,832
Δ APR - Term Loans - Crisis	0.45	0.35	0.16	0.57	0.71	67,491

Table 4: Credit Supply by Italian and Foreign Banks (simple average)

	Italian	Foreign
6-month log changes		
$\Delta\text{Log Credit - pre crisis}$	-0.0373	-0.0516
$\Delta\text{Log Credit - post crisis}$	-0.0704	-0.0547
6-month changes, percentage points		
$\Delta\text{APR - Revolving - Pre crisis}$	0.43	0.34
$\Delta\text{APR - Revolving - Crisis}$	0.89	0.62
6-month changes, percentages		
$\Delta\text{APR - Term Loans - Pre crisis}$	0.34	0.30
$\Delta\text{APR - Term Loans - Crisis}$	0.52	0.30

Table 5: Home Country of Banks included in the sample and changes in spreads

Country	Number of relationships	%	$\Delta\text{Spread - Pre crisis}$	$\Delta\text{Spread - crisis}$
			basis points	basis points
Austria	8,395	1.26	-0.4	32.7
Switzerland	207	0.03	-9.4	45
Germany	22,846	3.44	0	0
Spain	4,353	0.66	3.2	83
France	134,954	20.32	-3.7	38
UK	2,312	0.35	-44	34
Japan	463	0.07	-13	98
Netherlands	2,908	0.44	5.1	15
Slovenia	42	0.01	-7.6	110
United States	9,339	1.41	-37	7.8
Total foreign	185,819	27.98		
IT	478,379	72.02	12	192

Table 6: Descriptive Statistics of Relationship-Level Controls

		Mean	Median	p25	p75	StdDev
whole sample	Share %	24.4	17.6	8.5	34.7	21.1
	Drawn/Granted %	63.7	75.0	35.7	97.8	35.7
	Share overdraft %	23.7	9.1	1.5	30.7	31.9
Italian	Share %	23.6	16.8	8.2	33.1	20.8
	Drawn/Granted %	62.2	71.5	33.4	96.2	35.8
	Share overdraft %	24.4	10.0	2.3	32.2	32.0
Foreign	Share %	27.3	20.0	8.5	41.7	23.2
	Drawn/Granted %	69.6	87.6	43.2	100	13.3
	Share overdraft %	21.9	5.0	0	25.9	32.1

Table 7: Balance Sheet Variables of Banks

		Mean	Median	p25	p75	StdDev
Italian	T1 Ratio %	17.2	14.2	11.3	19.0	13.3
	Interbank / Assets %	4.6	2.4	0.75	5.55	7.94
	Exposure to Giips / Assets %	14.4	12.3	7.5	18.7	9.8
	Log Assets	6.0	5.8	4.9	6.7	1.55
Foreign	T1 Ratio %	12.8	11.4	10.4	13.6	5.2
	Interbank / Assets %	18.3	17.7	11.2	23.9	9.3
	Exposure to Giips / Assets %	1.64	0.88	0.19	2.22	2.03
	Log Assets	19.7	20.3	18.1	20.9	1.6

Table 8: Baseline - Credit quantity

DEP VARIABLE	(1)	(2)	(3)	(4)
	$\Delta \text{LOG}(\text{CREDIT}) - \text{granted} \quad \Delta \text{LOG}(\text{CREDIT}) - \text{drawn}$			
DOMESTIC BANK	0.00970 (0.00836)		-0.0607*** (0.0140)	
DOMESTIC BANK*CRISIS	-0.0298** (0.0116)	-0.0284** (0.0116)	-0.0525** (0.0234)	-0.0553** (0.0233)
SHARE OF TOTAL CREDIT	-0.00119*** (0.000162)	-0.00143*** (0.000149)	-0.000521* (0.000306)	0.000183 (0.000248)
DRAWN OVER GRANTED	0.00833 (0.00733)	0.0191*** (0.00726)	-1.315*** (0.0415)	-1.385*** (0.0379)
OVERDRAFT OVER TOTAL CREDIT	0.131*** (0.00925)	0.119*** (0.0107)	-0.0308 (0.0200)	0.00546 (0.0227)
FIRM*TIME FIXED EFFECTS	yes	yes	yes	yes
BANK FIXED EFFECTS	no	yes	no	yes
Observations	664,198	664,198	569,608	569,608
R-squared	0.289	0.294	0.342	0.347
Number of Firm-Period Observations	164,470	164,470	146,886	146,886

standard errors clustered at bank and firm level in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 9: Baseline: Interest Rates

VARIABLES	(1)	(2)	(3)	(4)
	$\Delta APR - REVOLVING$	$\Delta APR - TERM$		
DOMESTIC BANK	0.0424 (0.0614)		0.0142 (0.0159)	
DOMESTIC BANK*CRISIS	0.208* (0.114)	0.210* (0.113)	0.154** (0.0629)	0.154** (0.0626)
SHARE OF TOTAL CREDIT	0.000337 (0.000409)	0.000292 (0.000292)	9.11e-05 (0.000161)	-0.000145 (0.000181)
DRAWN OVER GRANTED	0.0891*** (0.0237)	0.106*** (0.0201)	-0.0935*** (0.0234)	-0.0620*** (0.0200)
OVERDRAFT OVER TOTAL CREDIT	0.139*** (0.0288)	0.177*** (0.0218)	0.0477** (0.0227)	0.0479** (0.0205)
FIRM*TIME FIXED EFFECTS	yes	yes	yes	yes
BANK FIXED EFFECTS	no	yes	no	yes
Observations	203,042	203,042	134,323	134,323
R^2	0.319	0.320	0.373	0.370
Number of Firm-Period Observations	51,175	51,175	39,612	39,612

standard errors clustered at bank and firm level in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 10: Placebo Experiment

DEP VARIABLE	$\Delta LOG(CREDIT)$					
	Event June 2010			Event Dec. 2010		
	Only 2010 (1)	(2)	(3)	2010 and H1-2011 (4)	(5)	2010 and H1-2011 (6)
DOMESTIC BANK	0.00777 (0.0118)		0.00777 (0.0119)		0.0107 (0.0128)	
DOMESTIC BANK*CRISIS	0.00578 (0.00452)	0.00651 (0.00487)	0.0000939 (0.00416)	0.00150 (0.00435)	-0.00839 (0.00803)	-0.00676 (0.00781)
FIRM*TIME FIXED EFFECTS	yes	yes	yes	yes	yes	yes
BANK FIXED EFFECTS	no	yes	no	yes	no	yes
Observations	688,562	688,562	1,045,143	1,045,143	1,045,143	1,045,143
R^2	0.258	0.263	0.270	0.273	0.270	0.273

standard errors clustered at bank and firm level in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 11: Gross Interest Rates

DEP VARIABLE	(1)	(2)
	$\Delta APR - REVOLVING$	ΔAPR_TERM
DOMESTIC BANK*CRISIS	1.228*** (0.382)	0.153** (0.0638)
SHARE OF TOTAL CREDIT	0.00642*** (0.00146)	-0.000187 (0.000179)
DRAWN OVER GRANTED	0.882*** (0.191)	-0.0638*** (0.0201)
OVERDRAFT OVER TOTAL CREDIT	1.142*** (0.164)	0.0528** (0.0205)
FIRM*TIME FIXED EFFECTS	yes	yes
BANK FIXED EFFECTS	yes	yes
Observations	203,042	134,323
R-squared	0.337	0.372

standard errors clustered at bank and firm level in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 12: Delta Spread

VARIABLES	$\Delta \text{LOG}(\text{CREDIT})$	$\Delta \text{APR} - \text{REVOLVING}$	$\Delta \text{APR_TERM}$
	(1)	(2)	(3)
DELTA SPREAD	-0.0126** (0.00609)	0.161** (0.0795)	0.107*** (0.0330)
SHARE OF TOTAL CREDIT	-0.00107*** (0.000173)	0.00128* (0.000741)	0.000429 (0.000290)
DRAWN OVER GRANTED	0.0136 (0.0111)	0.0975*** (0.0280)	-0.160*** (0.0351)
OVERDRAFT OVER TOTAL CREDIT	0.149*** (0.0146)	0.126*** (0.0347)	0.0695 (0.0438)
FIRM FIXED EFFECTS	yes	yes	yes
Observations	331,635	102,251	67,491
R^2	0.280	0.291	0.371

standard errors clustered at bank and firm level in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 13: Extensive Margin

DEP VARIABLE	Prob(cut=1) (1)	Prob(cut=1) (2)	Prob(accept=1) (3)	Prob(accept=1) (4)	APR_TERM (5)	APR_TERM (6)
DOMESTIC BANK	-0.0190 (0.0120)					
DOMESTIC BANK*CRISIS	-0.0156** (0.00736)	-0.0167** (0.00754)	-0.109*** (0.0364)	-0.0694*** (0.0216)	0.361* (0.203)	0.307** (0.119)
CRISIS			-0.154*** (0.0221)		1.331*** (0.183)	
SHARE OF TOTAL CREDIT	-0.00253*** (0.000149)	-0.00207*** (0.0000962)				
DRAWN OVER GRANTED	-0.0125* (0.00719)	-0.0375*** (0.00645)				
OVERDRAFT OVER TOTAL CREDIT	-0.0813*** (0.00617)	-0.0531*** (0.00377)				
SIZE OF THE LOAN					-0.594*** (0.0984)	-0.0620 (0.0714)
FIRM*TIME FIXED EFFECTS	yes	yes	no	yes	no	yes
BANK FIXED EFFECTS	no	yes	yes	yes	yes	yes
Observations	762,478	762,478	926,736	142,940	191608	60147
R-squared	0.407	0.429	0.088	0.110	0.342	0.651
Number of Firm-Period Observations	188,077	188,077		52,521		

standard errors clustered at bank level in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 14: Aggregate Effect

VARIABLES	$\Delta \text{LOG}(\text{CREDIT})$ (1)	$\Delta \text{LOG}(\text{CREDIT})$ (2)
DOMESTIC	-0.0109 (0.0178)	0.00328 (0.0107)
DOMESTIC*CRISIS	-0.0436*** (0.0131)	-0.0331*** (0.0103)
CRISIS	0.0104 (0.00931)	0.00489 (0.00783)
SHARE OF TOTAL CREDIT	-0.00109*** (0.000118)	-0.00110*** (6.75e-05)
DRAWN OVER GRANTED	-0.0176*** (0.00419)	0.0149*** (0.00307)
OVERDRAFT OVER TOTAL CREDIT	0.0710*** (0.00590)	0.105*** (0.00248)
FIRM EFFECT		0.689*** (0.0265)
Observations	164,470	164,470
R^2	0.017	0.609

Block-bootstrapped (cluster at bank level) standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Figure 1: Spread between 10-year Italian Btp and German Bund (percentage points)



Figure 2: General government primary net borrowing / lending (percent of GDP)

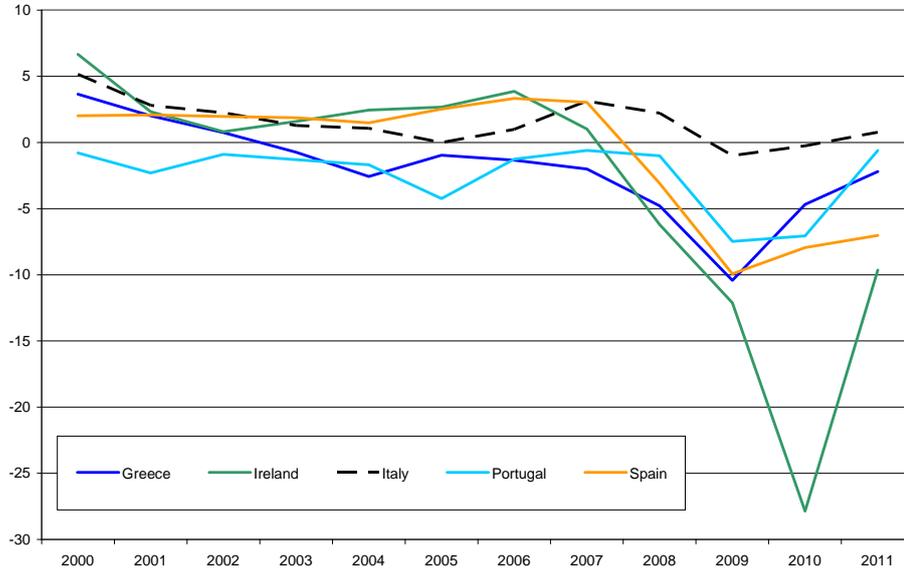


Figure 3: CDS spreads on 5-years senior debt of major banks (basis points)

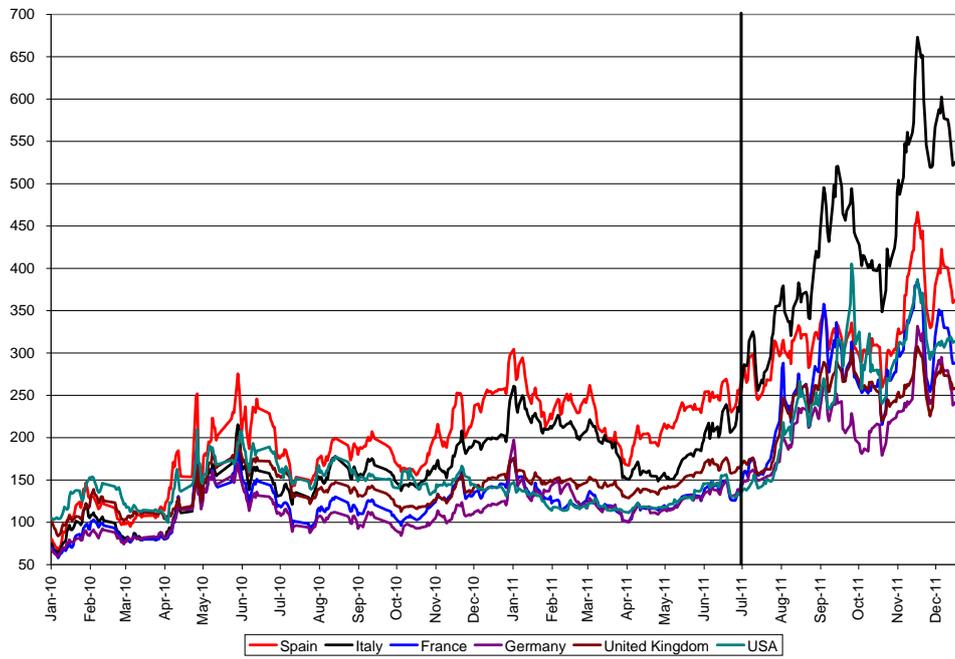


Figure 4: Change of credit granted by Italian and foreign banks (weighted average of log-changes of granted credit in each month relative to June 2011 - log points)

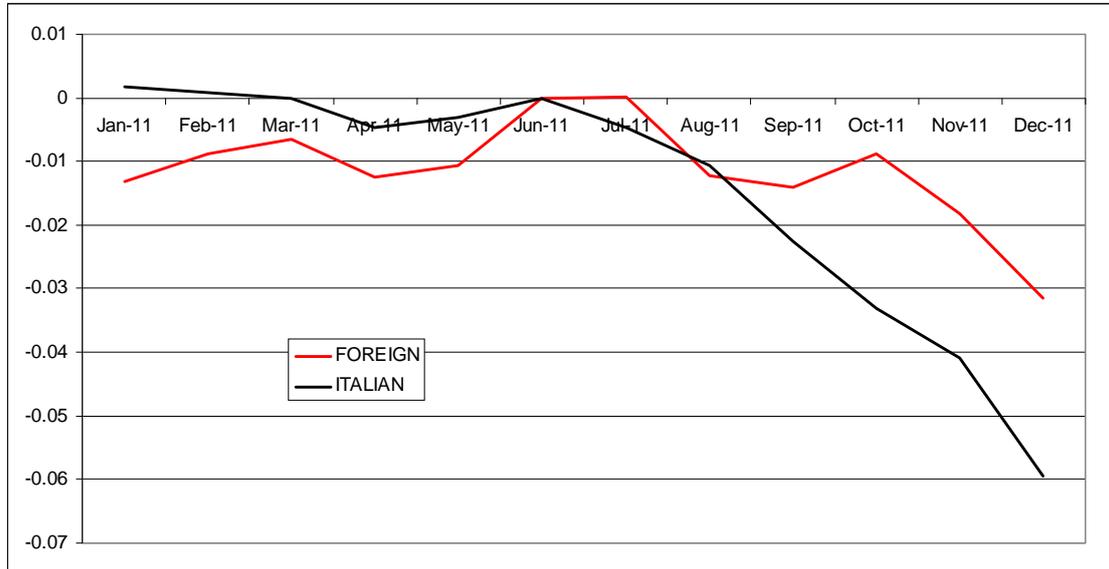


Figure 5: Change in the Annualized Percentage Rate on revolving credit lines (weighted average of changes of APR on revolving credit lines in each month relative to June 2011 - percentage points)

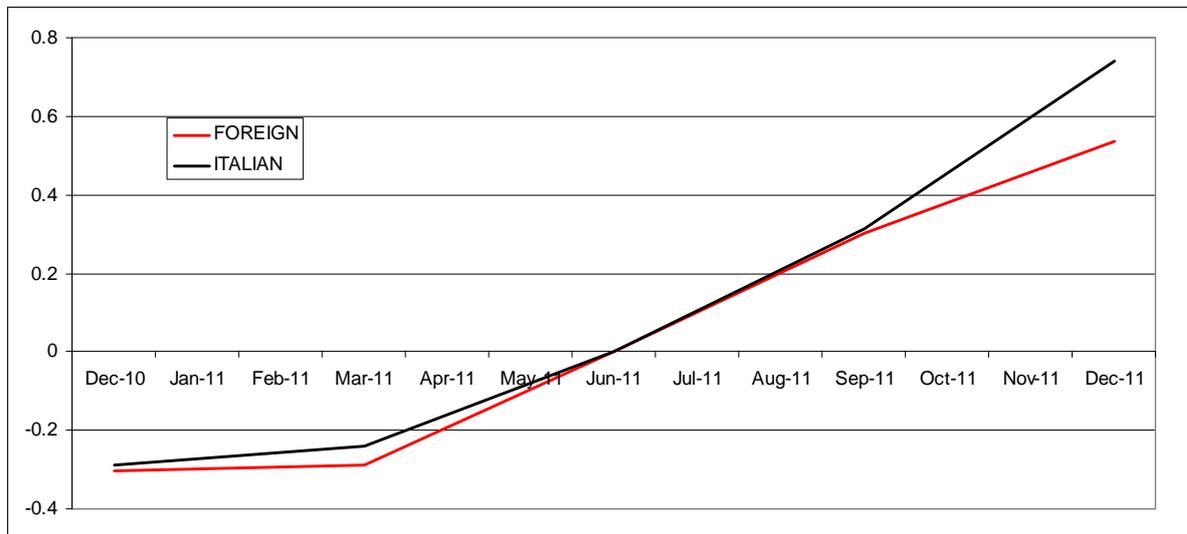


Figure 6: Change in credit granted, net of firms-period effects (growth rates of de-meanded credit granted in each month relative to June 2011 - percentage points)

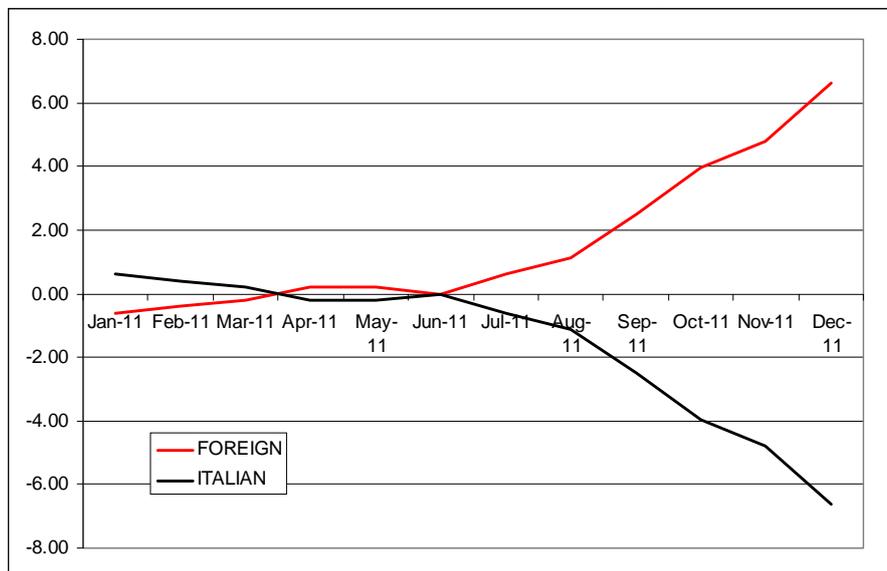


Figure 7: Change in Annualized Percentage Rate on revolving credit lines, net of firm-period effects (rate of change of de-meanded APR on revolving credit lines in each month relative to June 2011 - percentage points)

