International Financial Integration, Crises and Monetary Policy: Cross-Border Interbank Lending During the Euro Crises*

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Abstract

We analyze how international financial integration is affected by the recent financial and sovereign crises, exploiting euro-area proprietary interbank data, crisis and monetary shocks, and loan terms to the same borrower during the same day by domestic versus foreign lenders. Crisis shocks reduce the supply of cross-border liquidity, with stronger volume than pricing effects, thereby impairing international financial integration. On the extensive margin, the cross-border credit crunch is independently of quality. On the intensive margin, however, GIPS-headquartered debtor banks suffer in the Lehman crisis, but effects are stronger in the sovereign-debt crisis, especially for riskier banks. Consistent with asymmetric information being the key driver, the cross-border liquidity crunch is stronger for longer-term loans, and weaker for foreign lender banks that are located in the same country than the borrower. Nonstandard monetary policy improves interbank liquidity, but without fostering strong cross-border financial re-integration.

Keywords: financial integration, financial crises, cross-border lending, monetary policy, euro area sovereign crisis, international liquidity.
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1. INTRODUCTION

In stark contrast to historical systemic crises that were mainly plagued by retail runs, the global financial crisis—that started with the Lehman Brothers' failure on September 15, 2008, and intensified in the euro area after April 2010 with the sovereign debt crisis—was largely characterized by a reduction in wholesale funding liquidity (Freixas, Laeven and Peydró 2015). The last global crisis is however not different in key aspects with historical crises. Jordá, Schularick and Taylor (2011) and Gourinchas and Obstfeld (2012) show that financial crises tend to follow periods of strong private credit financed partly with foreign liquidity, and one important outcome of the last global financial crisis has been a geographic fragmentation of international liquidity in global financial markets, partially unwinding the trend in cross-border financial integration that occurred since the mid-1980s (Broner et al. 2013; IMF 2013). To combat this recent crisis, central banks have mainly responded using nonstandard monetary policies (Draghi 2013, Stein 2014).

In this paper, we offer an in-depth analysis of how the recent financial and sovereign debt crises affect international financial integration, including whether the new, expansionary nonstandard monetary policy actions may help to re-integrate financial market disruptions.[1] Despite the utmost importance of this question for scholars and policymakers, empirical analysis is scarce, mainly due to the lack of comprehensive micro-datasets—especially on the cross-border lending needed to analyze international financial integration—since wholesale credit transactions are mostly over-the-counter trades. Comprehensive micro-credit datasets, however, are necessary both to control for borrower fundamentals and to examine heterogeneity in cross-border versus domestic loan terms. In this paper, we use new lender-borrower transaction-level data from the euro area interbank market, derived from its interbank payment system Target2, and hence we analyze cross-border interbank lending during the euro crises.

The strengths of these data are various. First, different from other loan data, we can compare, for otherwise *identical* loans to the same borrower on the same day, the volume and spread of a foreign vs. a domestic lender. In other credit markets, loans among different lenders

[1] Throughout the paper, we refer to the flows of interbank credit as financial integration. The literature uses a variety of measures of financial integration (see, e.g., Edison, Levine, Ricci, and Slok 2002). We will use the terminology 'financial integration' and 'international liquidity' interchangeably. In this regard, the question about the effect of the recent crises episode on international liquidity may also be considered as one regarding constrained versus unconstrained liquidity.

to the same borrower are not granted on the same day (thus the borrower's risk is different) and have different maturities, currencies, or collateral; however, in interbank markets, if one exploits the data on (standard, plain vanilla) overnight loans in the central bank payment system, one can avoid this problem. Hence, not only is analyzing the interbank wholesale market key for studying the recent financial and sovereign debt crises, but it is also key for identifying the effects of crises on cross-border financial integration.

Second, as compared to the global financial market, the euro area is a single currency union, with a bank-dominated economy and strong financial integration with respect to its wholesale financial market. In contrast to the U.S. interbank data, we can study the cross-border dimension—which is the question that we address in this paper—and our database also provides us with identifiers for interbank credit transactions and the ultimate borrower and lender banks involved in the loan, all of which are crucial for identification. Moreover, the euro area had risks associated with various countries' sovereign debt, which gives our data larger cross-sectional and time variation in crisis shocks. Finally, before the Eurosystem's announcement of quantitative easing in January 2015, the Eurosystem pursued several new and nonstandard monetary policies whose main effects were felt on its banking system, given the importance of banks in the European financial and economic system (Praet 2016).

To identify the impact of this recent financial and sovereign debt crises on lending terms across borders as compared to domestically (thereby affecting international financial integration), we restrict the Target2 dataset to euro-denominated interbank overnight loans. We analyze loans granted to the same borrower on the same day, thus controlling for time-varying unobserved borrower fundamentals, thereby isolating differential bank-to-bank loan conditions (access, volume, and spread) by domestic versus foreign lenders (abstracting from other loan differences such as, e.g., maturity and currency). This empirical strategy implies—in the intensive and extensive margin of lending—analyzing the data at the *borrower-lender-day* level and adding borrower*day fixed effects. To further control for time-varying creditor bank conditions (e.g., liquidity hoarding or differently affected by the crisis) and for time-invariant lender-borrower bank relations (e.g., similar business models), we can add lender*day and lender*borrower fixed effects. Moreover, in conjunction with the euro area interbank data, we exploit both the Lehman failure and the sovereign debt shocks, since we have access to data starting from June 1, 2008, until December 31, 2014. We analyze separately the Lehman collapse

and the sovereign debt crisis, as the former is more bank-related and the latter is more dependent on sovereign risk, especially in countries rescued by the Troika (an ECB-EU-IMF bailout to Greece, Ireland, and Portugal, or to Spain's banking sector, the *GIPS* countries).

For both shocks, we not only identify the impact of the recent financial and sovereign debt crises events on cross-border loan conditions, but we also examine the role of asymmetric information problems as the key driver behind the reduction in cross-border liquidity during crises. To that aim, we examine whether the identified differential effect (domestic versus cross-border) is stronger depending on borrower location, or whether the potential reduction in cross-border liquidity might be due to a general preference by lenders to favor domestic over foreign borrowers, thus suggesting that nationality matters for international liquidity during uncertain times. In addition, we collect several variables to measure risk characteristics of the borrower bank. In our baseline regressions, we use an identifier for GIPS-headquartered borrowing banks, as these countries were at the core of the European sovereign debt crisis. Also, given the interrelation between a country's public finances and the banking sector, we collect data on each borrower-country's level of public debt as a fraction of its GDP. In addition, we follow Djankov, McLiesh and Shleifer (2007) and use the index on the borrower-country's protection of creditor rights. Moreover, we obtain information on bank balance sheet characteristics for each borrowing bank, i.e., asset size and leverage.[2] Finally, we analyze the role of nonstandard monetary policy in affecting the interbank liquidity supply, especially to the cross-border segment.

Our findings are robust. Recent financial crisis shocks reduce the supply of interbank liquidity on both the extensive and intensive margins, exerting a substantially stronger negative effect for cross-border loans, thereby impairing international financial integration. Specifically, when comparing the same bank borrower on the same day, the foreign lender is less likely to grant an interbank loan than the domestic lender as the crisis intensifies. Conditioning on granting the overnight loan, the foreign lender reduces the loan amount and increases the loan spread. During the worst part of each crisis event, compared to the domestic lender, the foreign lender reduces access to the same borrower on the same day by 29% during the Lehman crisis and by 24% during sovereign debt crisis, and reduces volume by 12% and by 10%, respectively.

[2] Apart from these variables, we have collected multiple other borrower- and country-level variables commonly used in the literature, which we will discuss further in Section 3.2.

Moreover, the impairment of cross-border liquidity is substantially stronger for volumes than pricing. Cross-border spreads additionally increase by 7 basis points during the Lehman shock; during the sovereign crisis, cross-border spreads only increase for GIPS-headquartered bank borrowers.

In the extensive margin (access to interbank liquidity), we find in both crisis periods that the reduction of the supply of cross-border liquidity is independent of borrower bank risk characteristics, including the country-level ones where the borrower bank is headquartered. These results suggest that the cross-border differential during crisis times in the extensive margin is independent of borrower bank risk and quality.

Differently, once a cross-border loan is granted, borrower risk characteristics matter for the volume and spread (intensive margin). In particular, within the cross-border segment, there is further heterogeneity depending on the risk of borrower banks. Interestingly, already during the Lehman crisis, comparing with other cross-border borrower banks, GIPS-headquartered borrower banks pay up to 17 basis points higher spreads for cross-border (as opposed to domestic) liquidity. Moreover, the cross-border liquidity crunch for GIPS-borrowers intensifies during the sovereign debt crisis, when GIPS-headquartered borrower banks also obtain substantially smaller cross-border loan amounts (reduction of up to 52%), in addition to paying higher spreads on these international loans (up to 14 basis points). Moreover, during the sovereign crisis, the reduction of cross-border loan amounts to GIPS-headquartered banks is stronger for highly-leveraged GIPS-headquartered borrower banks.

Consistent with theories on the presence of strong asymmetric information problems across borders (e.g., Freixas and Holthausen 2005), we show that the documented cross-border liquidity crunch during crises is driven by a reduction of lending by foreign banks that are *located* in a *different* country than the borrowing bank. In contrast, we do not find a strong contraction in liquidity supply by foreign banks that are *located* in the *same* country than the borrowing bank; instead, those foreign banks behave very similar to domestic banks. In fact, during the sovereign crises, foreign banks located in the same country as the borrower actually increase loan volumes to GIPS borrower, unlike foreign banks in different locations (which strongly cut back liquidity). As an additional test to highlight the role of asymmetric information in the cross-border credit crunch, we also look at interbank lending volumes with maturity longer than overnight. We show that, after Lehman's failure, term lending volumes witnessed a strong and sudden collapse by up

to 80 percent. Importantly, and consistent with asymmetric information problems as the key driver, the term liquidity freeze was more pronounced for cross-border loans on all margins of credit and has not recovered since. For example, after Lehman, we find an additional reduction in cross-border term loan volumes of up to 53.7 percent relative to overnight loans, and an additional increase in spreads of up to 50 basis points.

Finally, we find that expansionary nonstandard monetary policy partly mitigates interbank liquidity restrictions during crisis periods, but this public policy has limitations in fostering strong cross-border financial re-integration. For identification, we use a short time window (+/–1 week) to measure the effects around the three main expansionary monetary policy measures enacted over the two crisis periods: during the Lehman crisis, (i) the fixed-rate full allotment (FRFA), and during the sovereign debt crisis, (ii) the two 3-year long-term refinancing operations (LTROs), (iii) and Draghi's "whatever-it-takes" speech, including the related outright monetary transactions (OMT) program (ECB 2008; Draghi 2012a).

Exploiting the impact of these monetary policy changes on cross-border versus domestic loans, we find that all three measures improve more the supply of cross-border loans in the extensive margin, compared to domestic lending, but not in the intensive margin.[3] For example, all three expansionary monetary policies reduce the interbank rates for all loans, but with a similar effect on domestic and cross-border loans (despite that the crisis shocks were more negative on the cross-border segment). In addition, effects are similar for riskier banks (e.g., highly-leveraged GIPS-borrowers). Moreover, the OMT policy—both the Draghi speech and the announcement by the Eurosystem—has positive effects on (private) interbank liquidity despite that there was no actual injection of public liquidity, i.e., just the suggested possibility that this policy tool might be used.

CONTRIBUTION TO THE LITERATURE

Our main contribution to the literature is identifying how financial crises impact cross-border lending, thereby affecting international financial integration, and then offering an in-depth analysis of the factors explaining the reduction in cross-border lending, and the role that monetary policy can play in promoting international financial re-integration.

It is known that during financial crises, international markets often fall. For example, the

[3] Our monetary policy analysis focuses on overnight loans given that the term segment has completely collapsed after the Lehman failure and has not recovered since (see Appendix Figure A1).

2008–2009 financial crisis was accompanied by a reduction both in global trade (Levchenko, Lewis and Tesar 2010) and in gross capital flows (Broner et al. 2013), including a decline in international bank lending (Cetorelli and Goldberg 2011). Micro studies, such as Giannetti and Laeven (2012), have shown that the collapse of the global market for syndicated loans during financial crises can partly be explained by a reduction in cross-border lending. We contribute to this literature by studying the euro area interbank data in conjunction with the Lehman and sovereign debt shocks to identify the cross-border effects, analyzing also the factors explaining the reduction in cross-border lending and the role that monetary policy.

Importantly, we find that for otherwise identical loan contracts, cross-border loans are penalized more substantially and even more so on volumes than on interest rate spreads. Analyzing the interbank wholesale market is an important question in itself, as the series of global financial crises that began with the Lehman failure was mainly concentrated in the wholesale funding market. However, it is key to note that identifying the supply of cross-border loans is also important. We isolate the loan volume and spread to the same borrower by foreign versus domestic lenders in otherwise identical loan contracts, since borrowers that also have foreign lenders are different from those banks that mainly borrow domestically. Note also that in a global financial crisis, international banks can be more negatively affected, and as these banks have more cross-border loans than local banks, this fact will in turn mechanically reduce cross-border loan volumes even if the supply of cross-border loans would not change.[4]

There is also a large and growing literature on the euro area sovereign debt crisis that

[4] In a global financial crisis, global (international) banks are in general more affected. These banks have more cross-border loans, and therefore, the volume of cross-border loans will be reduced because the typical borrower of these loans is more negatively affected by the crisis. In consequence, the reduction of cross-border loans is not due to financial disintegration, but just that the typical borrower bank of these loans is riskier in the global crisis. Our empirical set-up controls for these issues as compared to the existing literature. As we explained above, in contrast to the literature using macro-, bank- or firm-level data, or even the literature using loan-level data, we can isolate differential bank-to-bank loan terms (volume and spread) for overnight-euro-denominated-uncollateralized loans granted to the same borrower on the same day for the same maturity by distinguishing between domestic and foreign lenders. Therefore, we also contribute to the literature on the credit channel by identifying the supply of credit. Khwaja and Mian (2008) show that—in order to identify the credit supply—loan-level (lender-borrower level) data are required; see also Paravisini (2008). They compare different business loans to the same borrower in the same quarter or year and argue that variations in lending from different banks must be associated with bank-related shocks. A critique of this line of research is that business loans from different banks are different for the same firm; for example, the purpose of the loan or its maturity or currency, and moreover the moment in which the contract is granted, and thus borrower fundamentals differ. Since we exploit *identical* loan contracts granted to the same borrower from different lenders on the same day using a standard, plain vanilla overnight loan in the central bank payment system (with potential different loan volumes and spreads by foreign versus domestic lenders), we can identify a better measure of credit supply restrictions (in this case, those related to the cross-border dimension in the interbank market).

started in 2010 (see, e.g., Sinn 2013; Acharya, Drechsler, and Schnabl 2014; Farhi and Tirole 2014; Uhlig 2014). The euro area sovereign debt crisis is generally perceived as being caused by increased concern about sovereign debt defaults, which could make the euro area's financial system to become increasingly fragmented (IMF 2013). Our results show that—even for the highly integrated interbank market—financial integration achieved within the euro area prior to 2008 was not crisis-resistant. More importantly, our results show that the geographic market segmentation during the euro area crisis is not only due to the elevated risk of sovereign defaults, as we also find that the Lehman shock particularly affected cross-border lending. However, unlike the Lehman crisis shock, the sovereign debt shocks differentially affected GIPS-headquartered borrower banks, especially those with higher leverage.

Our paper also adds to the banking literature by contributing to the studies investigating interbank liquidity. During financial crises, there may be a reduction in interbank lending (Acharya, Gale, and Yorulmazer 2011) due to borrowers' counterparty risk (Flannery 1996; Furfine 2001; Freixas and Jorge 2008) or because of lenders' liquidity hoarding (Allen, Carletti, and Gale 2009; Caballero and Krishnamurthy 2008; Diamond and Rajan 2011). In a seminal paper, Afonso, Kovner, and Schoar (2011) analyze conditions in the U.S. unsecured interbank market around the time of the Lehman Brothers' bankruptcy, show that counterparty credit risk plays a larger role than liquidity hoarding in tightening interbank loan terms, and do not find an interbank market freeze. Pérignon, Thesmar, and Vuillemey (2017), analyzing bank-level unsecured certificates of deposits in the European market, do not find any market-wide freeze during the 2008–2014 period. We contribute to this literature by empirically identifying the *supply of cross-border interbank liquidity*. Freixas and Holthausen (2005) theoretically analyze the impairment of cross-border interbank lending due to noisy information across borders. We empirically show a reduction in the supply of cross-border interbank liquidity—a freeze in bank-to-bank liquidity by foreign banks in a different country than the borrowing bank—and its determinants.[5]

Finally, we contribute to the literature on monetary policy. The interbank market is a key channel for transmitting monetary policy to the real economy, but in a financial crisis, this

[5] Furfine (2003), Iyer and Peydró (2011), and Acharya and Merrouche (2013) respectively analyze the U.S., Indian, and U.K. interbank markets during a financial crisis. Moreover, some policy papers have analyzed cross-border loans (Bindseil, Cour-Thimann, and König 2012; Garcia-de-Andoain, Hoffmann, and Manganelli 2014), but unlike these papers, we identify the effects at the *lender-borrower-day* level. As we explain in this paper, this empirical strategy is crucial for identifying the cross-border effects.

transmission mechanism may be impaired (Draghi 2012b). On the theoretical front, Gertler and Kiyotaki (2010) show how problems in the interbank market can generate aggregate real effects in the macroeconomy and how nonstandard monetary policy can alleviate these problems (see also Gertler and Karadi 2011, 2013; Kiyotaki and Moore 2012); at the micro level, Bolton and Freixas (2006), Diamond and Rajan (2006) and Stein (2012) highlight the importance of monetary policy for banking, while Freixas, Martin, and Skeie (2011) and Allen, Carletti, and Gale (2014) argue that monetary policy can directly improve liquidity conditions in the interbank market (Bolton, Santos and Scheinkman (2011) show the limits of private liquidity in crises). Despite the importance of these questions for theory and policy, as far as we are aware, there is no other paper using bank-to-bank micro-level data to identify the effects of monetary policy on interbank liquidity supply in crises. Our evidence shows the positive role that monetary policy can play in improving interbank liquidity, yet it also suggests limitations of monetary policy in promoting cross-border financial re-integration.

The remainder of this paper is as follows. Section 2 describes our dataset. Section 3 discusses our identification strategy and results. Section 4 concludes with a concise summary of the paper.

2. DATA

We have access to transaction-level data on interbank loans with information on the price, volume, maturity, time of the loan transaction, and the identity of the ultimate borrower and lender, for all loans settled via Target2 by euro area banks from June 1, 2008, to December 31, 2014. Target2 is the Eurosystem's main payment and settlement system and carries out more than 90% of all fund flows between pairs of credit institutions in the euro area. 91% of the aggregate Target2 turnover refers primarily to interbank payments as it settles payments on a continuous basis, in central bank money, and with immediate finality.[6] From the Target2 payment data, as we explain below, we obtain wholesale interbank funding information at the bank-to-bank level, data that are otherwise not observable due to the bilateral nature of over-the-counter trades.

[6] The value of all interbank payments executed in Target2 in four days corresponds to the total annual GDP of the euro area. Money market transactions may also be settled via EURO1, the second, yet much smaller, large-value payment system with a daily turnover of less than 8.3% of Target2 (Arciero et al. 2016).

There are three main advantages of using Target2 interbank transaction data compared with the U.S. Fedwire or any other major payment system. First, in Target2 the payment legs of interbank money market transactions are classified as interbank credit payments, which are crucial for identifying interbank loans. Given that we only focus on these interbank transactions, we match the two payment legs of an interbank loan (i.e., the initial payment of the principal amount and the repayment of the principal plus an additional amount that acts as interest) and obtain further details on the transactions (prices and maturities) in addition to the volume, by employing a refined version of Furfine (1999)'s algorithm as developed by Arciero et al. (2016).[7]

Second, for each loan, Target2 interbank credit payments reflect the information on the ultimate lender and borrower. This information is crucial for the identification of the lender's and borrower's country of origin that in turn is essential to identify cross-border versus domestic loans (the key question of this paper, along with other related questions such as borrower banks headquartered in crisis countries, i.e., Greece, Ireland, Portugal, and Spain, to which we will refer as the GIPS countries, hereafter). In comparison, Fedwire data only have information on the settling institutions.[8] In addition to the information on the borrower location (country of origin), Target2 contains information on each bank's parent nationality to identify cross-border and domestic trades from foreign-controlled banks (e.g., Deutsche Bank in Spain lending to Banco Santander in Spain would be classified as a domestic loan, but from a foreign bank).

Third, the algorithm-based estimation quality has been checked against actual loans from some euro area countries using transaction-level information from either supervisory datasets (Bank of Spain) or from private datasets (Italy's e-MID). Arciero et al. (2016) and De Frutos et al. (2014) validate the Target2 interbank loan data using the Italian uncollateralized e-MID

[7] The algorithm matches payment legs such that the implied loans have a minimum amount of 1 EUR million (a volume-dependent minimum increment amount), an interest rate that lies in a corridor depending on the average European money market interbank rate, EONIA, and interest rates in multiples of 0.005 percentage points. For an explanation and validation of the algorithm, please refer to Arciero et al. (2016). To ensure robustness, we try several parameter combinations and find that our results are not driven by the choice of the algorithm. In particular, we run the algorithm for various symmetric and asymmetric corridor widths around EONIA. Furthermore, we employ a corridor-free approach on overnight loan payments. Our main results remain unaffected by these changes to the algorithm-based identification technique.

[8] In our analysis, we exclude intra-group transactions as the risk of a loan between two banks of the same banking group is not as risky as a loan granted to another, external bank. For cross-border trades, this ensures that loans between banks belonging to the same holding group are excluded. Target2 has an indicator variable that identifies interbank payments within the same banking group. We have left these cross-border transactions within a bank holding group for future research. Moreover, we also use the unique bank identifier code (BIC) and consolidate banks on their first six digits (from the initial eleven digits) to account for the different branches and subsidiaries in the domestic market.

trading platform and the Spanish unsecured post-trading platform MID, respectively. The quality checks provided by these studies reveal that the Target2 interbank loan-level data match very well the actual Italian and Spanish unsecured money market data (identifying incorrectly less than 1% of payment legs as interbank loans), which also verifies the unsecured nature of the loans in our data. The quality of the interbank data for the United States and the United Kingdom is not easy to validate due to the lack of actual transaction-level data (Armantier and Copeland 2012).[9]

We supplement our database on interbank loans with information on the borrowing institution, both at the borrower-country and borrower-bank level, to investigate if the supply of cross-border liquidity depends on borrower characteristics. More precisely, we compute an identifier for GIPS-headquartered borrowing banks, i.e., banks headquartered in Greece, Ireland, Portugal, or Spain, as these countries were at the core of the European sovereign debt crisis. Also, we follow Djankov, McLiesh and Shleifer (2007) and use the index on the borrower-country's protection of creditor rights. Moreover, given the interrelation between a country's public finances and the banking sector, we collect data on each borrower-country's level of public debt as a fraction of its GDP from Eurostat. Further, we obtain standard information on bank balance sheet characteristics for each borrowing bank, i.e., asset size and equity, which we collect from Bureau van Dyk's Bankscope.[10]

3. EMPIRICAL STRATEGY AND RESULTS

This section starts with a thorough discussion of the general empirical strategy that we use to identify how the recent financial and sovereign debt crises impact cross-border lending and provide some summary statistics. Furthermore, we present and discuss the results, both for the period surrounding the Lehman failure and the sovereign debt shocks. First, we examine the overall effects of both the recent financial crises on cross-border versus domestic lending. Second, we examine the drivers behind the reduction in cross-border (versus domestic) interbank liquidity during crises. Third, we show the results on monetary policy.

[9] Kovner and Skeie (2013) assess the U.S. data using banks' fed funds borrowing as reported in the quarterly FR Y-9C filings. They show that flows of overnight loans extracted from Fedwire payments data explain 78% of these outstanding overnight loans at quarter ends reported by big U.S. bank holding companies.

[10] While these variables enter our benchmark specifications, we have collected multiple other borrower- and country-level variables that did not turn out to be relevant factors in our analysis. We discuss these other variables and the robustness checks in the results section.

3.1. IDENTIFICATION STRATEGY

To identify the impact of the recent financial and sovereign debt crises on cross-border lending, we examine the differential cross-border lending behavior of euro area banks relative to domestic lending using the data at the *lender-borrower-time* level for two main reasons. First, this allows us to control for unobserved and observed heterogeneity in time-varying fundamentals for borrowers and lenders, and also for unobserved and observed heterogeneity in time-invariant fundamentals for borrower-lender pairs. Second, loan-level data allow us to isolate the heterogeneous effects across bank-pairs in providing credit; specifically, whether the cross-border versus domestic loan terms to the *same* borrower on the *same* day are different.

In our main analysis, we focus only on *overnight* interbank loans, but we also examine interbank loans with longer maturity than overnight in Section 3.4.[11] Unlike other credit markets, the overnight segment of the interbank market is very active—even during crisis periods—and thus allows comparing truly identical loans—i.e., overnight-uncollateralized-euro-denominated loans to the same borrower on the same day—with characteristics only differing in the volume and spread of the associated loan depending on whether the lender is a domestic or a foreign bank. To identify this differential effect, it is crucial to control for time-varying observed and unobserved borrower-bank-specific fundamentals, such as higher counterparty risk with borrower*day fixed effects (Khwaja and Mian 2008).[12] Hence, on the same day for the same borrower, we compare the loan conditions among foreign vs. domestic lenders for otherwise identical loans.[13]

To further isolate the supply of cross-border (versus domestic) loans, where the variation is at the bank-to-bank level, we control for lenders' time-varying unobserved and observed

[11] In 2008, the turnover in the overnight interbank credit market was about 5.2 times the size of the GDP of the entire euro area. Relative to the market capitalization of all euro area banks, the size of the overnight interbank market equals 12.4%. The overnight interbank market is less risky than the longer-term segment, implying that our economic effects can be considered as a lower bound. After the Lehman's failure, the interbank term lending activity dropped by more than 80%, and did not recover in the period thereafter. The remaining term lending is not sufficient for the application of our tight identification strategy that we introduce in this section as we do not have enough multiple loans with the same maturity granted by a foreign and a domestic lender to the same borrower on the same day.

[12] We apply the borrower fixed effects estimator as in Khwaja and Mian (2008). This estimator has been used extensively in the literature to analyze granted loans by controlling for borrower unobserved heterogeneity as a proxy for demand. Jiménez, Ongena, Peydró, and Saurina (2012) analyze loan applications, but these data are not available for interbank liquidity.

[13] Note that we do not identify syndicated loans, which are longer-term than overnight. This is important as an extension of such a loan to a borrower might appear as a loan from a syndicate of different banks to the same borrower, while the key decisions are made by the lead arranger, which might or might not be in the same country.

fundamentals by adding lender*day fixed effects (Jiménez, Ongena, Peydró, and Saurina 2014). By adding these effects, we control whether the lender has, for instance, more or less liquidity (volume and cost) to lend on a given day (thus controlling, e.g., for lender's liquidity hoarding). Finally, we add lender*borrower fixed effects to account for time-invariant effects of persistent lender-borrower characteristics such as the overall amount of cross-border versus domestic loans or similar business models. Hence, we identify the pure effects of time-varying crisis shocks on cross-border versus domestic loan conditions (i.e., we employ a difference-in-differences analysis).

Given these sets of fixed effects that we use for our empirical identification, we consider only loans where both the lender *and* the borrower have at least two counterparties per day and where at the same time the lender-borrower pair has at least traded twice in our sample. Moreover, to analyze the cross-border versus domestic funding effects, in all our regressions we exclude loans from borrowers and lenders that have not borrowed or lent at least once both domestically *and* across borders in the period prior to August 2008 (i.e., before the sample we use for the Lehman's period). Hence, our analysis focuses precisely on those banks that had cross-border loans before the Lehman failure. Given these identification restrictions, our final sample consists of interbank loans between 141 borrower banks and 196 lender banks, making a total of 3,136 distinct bank pairs, which corresponds to the approximately 200 largest banks operating in the euro area.

To empirically proxy for the access to overnight credit, we create a binary variable at the borrower-lender-day level as follows. Given our final sample of 3,136 bank pairs (after applying all restrictions as discussed above) we set the binary variable to the value one on any day on which we observe a loan between the given bank pair (a given borrower and a given lender) in our sample, and zero on any other day on which there is not an interbank loan for the same bank pair in our sample. We refer to this binary variable as the extensive margin of credit (Access).

The intensive margin of credit denotes the loan terms—volume and spread—for all the granted loans (i.e., when Access equals the value one). We measure the volume as the logarithm of the respective loan amount (in EUR million), and the interest rate spread as the difference between the interest rate paid on the loan and the deposit facility rate, i.e., the interest rate paid

on excess reserves (IOER).[14] We refer to these variables as Volume and Spread. In case of multiple loans for the same bank pair during one day, we aggregate volumes and compute the quantity-weighted interest rate, i.e., all the different loans between a lender and a borrower in a day are aggregated and thus in our paper we use the expression at the loan-day level to denote the lender-borrower-day level.

In conjunction with the euro area interbank data, we exploit the Lehman and sovereign debt shocks to identify the effects that the recent financial crises have on the supply of cross-border lending, which in turn affects the level of international financial integration. We analyze the Lehman failure and the sovereign debt crisis as separate events, as the former one is more bank-related and the latter one depends on GIPS sovereign risk. Consistent with the differential nature of the two crisis periods, we proxy the crisis intensity in the euro area—our variable Crisis—in the Lehman period by the three-month Euribor-OIS spread (in percentage points), and in the sovereign debt crisis period by the mean of the logarithm of the five-year periphery country CDS spreads (in basis points).[15] For the sake of presentation, we rescale the range of both crisis variables in our regressions to [0,1], such that the value one represents the highest crisis intensity in each period and zero its lowest value.[16] We use the period from August 18, 2008, to November 9, 2008, to analyze the Lehman crisis (60 days, with four weeks preceding and eight weeks following the Lehman's failure). We study the sovereign debt crisis over the period from July 1, 2009, to December 31, 2014 (1,356 days).[17] We analyze the impact of the

[14] During the crisis, the Eurosystem's expansionary monetary policy via the fixed-rate full allotment procedure pushed the overnight interest rates far below the main refinancing rate (the pre-crisis instrument to steer interbank interest rates), and toward the deposit facility rate, i.e., the rate paid on excess reserves (e.g., ECB 2013). Therefore, we use the deposit facility rate to measure the interest rate spread.

[15] In (unreported) regressions, we checked the robustness of our results to using indicator crisis variables. For the Lehman crisis sample, we find qualitatively similar results suggesting that this crisis sample represents a period of elevated aggregate financial stress in cross-border interbank markets. For the sovereign debt crisis, however, we find that our results depend on using the continuous variable (as opposed to a binary crisis variable that equals one after Greek's problems start in April 2010), which suggests that the continuous variable is more appropriately capturing the dynamics associated with the sovereign debt crisis than one specific dummy variable. Moreover, the fact that we find stronger results when the crisis intensifies lends further support to the notion that our results reflect the information asymmetry between foreign and domestic banks in uncertain times.

[16] We rescale each variable X in the following way: $(X - X_{min}) / (X_{max} - X_{min})$, where the index 'min' and 'max' denote the minimum and maximum value of X in either the Lehman and sovereign sample, respectively.

[17] We choose the estimation sample for the Lehman period to start four weeks before Lehman's failure on September 15, instead of eight weeks as our data only start in June 2008 but we need some pre-sample loans to identify banks that are active in the cross-border segment (see previous pages). We extend the sample to eight weeks after Lehman as a decline in overnight credit was only observed two weeks after Lehman's failure (see the initial version of this paper where we have documented that, immediately after Lehman failure, term credit dropped dramatically while overnight volumes increased and only fell after term volumes stabilized at virtually zero). For the

recent financial and sovereign debt crisis shocks on cross-border loan conditions using the following linear regression model:

$$Loan_{i,j,t} = \beta \cdot Crisis_t \cdot Cross\text{-}border_{i,j} + \alpha_{j,t} + \alpha_{i,t} + \alpha_{i,j} + \varepsilon_{i,j,t} \quad (1)$$

where Loan refers to the loan conditions (Access, Volume, and Spread) that borrower *j* receives from lender *i* on day *t*. Cross-border is a dummy variable that equals the value one if borrower and lender banks are headquartered in different countries, and zero otherwise. Equation (1) represents our benchmark regression that includes the strongest set of fixed effects: borrower*day, lender*day, and borrower*lender fixed effects.

We start our regression with borrower fixed effects, then saturate the regressions with different fixed effects progressively, and then move to equation (1) that refers to the specification with the strongest set of fixed effects (and thus with our strongest identification).[18] We estimate equation (1) with least squares (due to the presence of a large set of fixed effects) and compute heteroskedasticity-robust standard errors clustered at the bank-pair level given that the main variable we are interested in is the cross-border dummy, which varies at the bank-pair level.[19] Finally, we slightly vary the main specification when we analyze the results on the factors explaining the cross-border results and on the monetary policy part. We explain these variations to our main specification when we introduce those results.

Table 1 presents the summary statistics of the interbank overnight loans covering our two financial crisis periods. Out of 7,348 overnight loans during the Lehman period (August 18, 2008, to November 9, 2008), 49.13% are lent out to foreign borrowers as cross-border loans. In the sovereign debt period from July 1, 2009, to December 31, 2014, the fraction of cross-border loans amounts to 38.20% (out of a total of 38,294 overnight loans). Note that the number of interbank loans refers to the dataset after we have imposed all the restrictions for the identification, in particular related to the fixed effects (i.e., borrower*day, lender*day, and borrower*lender fixed effects) that we explained above.

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sovereign debt sample, we choose mid-2009 as the start to have sufficient pre-crisis interbank loans before the sovereign debt problems of Greece began in April–May 2010. Also, money market tensions relaxed and returned to their pre-Lehman means around mid-2009, as, e.g., indicated by the three-month Euribor-OIS spread.

[18] In a previous version of the paper, we had many more specifications with all the different sets of fixed effects, but for the sake of brevity (both in terms of pages and tables), in the current draft we do not show those robustness tests.

[19] See Moulton (1986, 1990) and, e.g., Wooldridge (2002). Our results, however, are all robust to multi-way clustering at the bank-pair and time level.

For the granted loans, the median loan amount is twice as large for cross-border loans as for domestic loans (see Table A2 in the appendix). During the Lehman period, the mean amount of cross-border loans amounts to 198 EUR million (median: 100 EUR million) as compared to 109 EUR million (median: 50 EUR million) for domestic loans; in the sovereign period, the mean amount of cross-border loans is 268 EUR million (median: 150 EUR million) as compared to 132 EUR million (median: 50 EUR million) for domestic loans.[20] For the same borrower on the same day, the median loan in our Lehman sample (sovereign debt period) amounts to 123 (140) EUR million from cross-border loans and 75 (53) EUR million for domestic loans; for the same borrower on same day, the total amount borrowed from cross-border amounts on average to 468 EUR million (median: 655 EUR million) during the Lehman period, while the daily total amount borrowed from domestic lenders amounts on average to 287 EUR million (median: 137 EUR million); during the sovereign period, the total cross-border borrowing amount is on average 416 EUR million (median: 200 EUR million), while the total domestic borrowing volume equals 211 EUR million on average (median: 94 EUR million).[21]

Borrowers with higher cross-border loans are substantially larger (in total assets) than borrower banks with more domestic borrowing. Also, for the same borrower on the same day, cross-border lenders are on average 2.5 times larger in size (total assets) and twice as leveraged than the domestic ones.[22] Moreover, the average interbank spread paid for cross-border trades corresponds to 88.19 basis points in the Lehman period (and 22.06 basis points in the sovereign debt sample) with a standard deviation of 32.06 basis points (21.61 basis points during the sovereign debt crisis). In the domestic segment, the spread amounts to 80.17 basis points during the Lehman period and 22.65 basis points during the sovereign debt sample with a standard deviation of 39.11 basis points and 23.94 basis points, respectively.

These summary statistics again highlight the importance of examining the interbank credit supply at the lender-borrower level, since using aggregate data at the bank or country level on interbank lending would mask these differences and could therefore be misleading. For example, in a global financial crisis, global (international) banks are in general more affected. These banks have more cross-border loans, and therefore, the volume of cross-border loans will

[20] In the raw dataset, the average weekly total borrowing volume before the Lehman failure in the cross-border segment is 146.8 EUR billion and 128.85 EUR billion in the domestic segment.
[21] The results referring to the last sentence are not reported in the tables for the sake of saving space.
[22] If we control for loan size in interactions and in levels, our results are robust.

be reduced because the typical borrower of these loans is more negatively affected by the crisis. Then the reduction of cross-border loans would not be due to financial disintegration, but just because of the fact that the typical borrower bank of these loans is riskier in the global crisis. Therefore, bank-level data—as compared to bank-to-bank (loan) level data—are not adequate for identification. Moreover, apart from the loan-level data, borrower*day fixed effects are crucial to control for unobservable time-varying borrower risk.

Figure 1 shows our crisis measure for both samples. The spread between the three-month Euribor and the correspondingly-dated OIS rate (Figure 1.A) substantially increases after the Lehman failure on September 15, 2008, to a maximum of 207 basis points. The crisis measure was stable in our pre-Lehman sample despite that there were significant turbulences during the summer of 2007. In Figure 1.B, we plot the average of the five-year periphery country CDS spreads over the sovereign debt crisis period, which increases from 89 basis points at the beginning of our sample on July 1, 2009, to values of 296 basis points when Greece experienced its first difficulties in April 2010, and reaches 772 basis points in the Summer of 2011. Both figures show that our crisis measures are well suited to measure the crisis shocks and their intensification in each of our two crisis shock periods accordingly.

3.2 IMPACT OF RECENT FINANCIAL CRISES ON CROSS-BORDER LENDING

In this section, we analyze the impact of the two recent financial crisis shocks on credit supply, and particularly, on the cross-border lending segment. We first analyze the extensive lending margin in Table 2 and then the intensive lending margin in Table 3. The results in this section provide the paper's basic findings.

Before we move to the lender-borrower-level data, we start by examining whether the two crisis shocks reduce borrower banks' overall access to interbank credit. In Table 2, columns 1 and 5, we examine the impact of the recent financial crisis shocks on the daily access to interbank credit at the borrower bank level during the Lehman and sovereign debt period, respectively. Our results suggest that, during both crisis periods, the crisis shocks imply a reduction in access to interbank borrowing, which is binding at the borrower bank level; i.e., a given borrower is not able to (fully) offset a contraction in credit supply by one lender through an increase in borrowing from another lender, thereby affecting its overall credit availability. During the Lehman period, this decline amounts to a maximum of 2.89 percentage points at the

worst moment of the crisis, which—compared to the pre-Lehman average borrowing probability of 12.93 percentage points—translates into a relative credit reduction in funding access by about 22.35% (2.89/12.93). For the sovereign debt period, the absolute decrease of 1.34 percentage points corresponds—when compared to the pre-sovereign-debt-crisis average borrowing probability of 10.64 percentage points—to a relative reduction in access by about 12.59% at the worst moment of the crisis. Therefore, conditioning on the same borrower, the results suggest that banks experience a strong decline in interbank overnight funding access during the crisis.

We next analyze the supply of interbank credit at the loan level. Controlling for borrower, lender, and time (day) fixed effects, in Table 2, columns 2 and 6, we find that the overall credit access of cross-border loans is lower than the one of domestic loans (3.86 percentage points less likely during Lehman and 1.92 percentage point less likely during the sovereign debt period). More importantly, in columns 3 and 7, we add the variable Crisis*Cross-border to examine whether there is an additional time-varying differential cross-border effect related to the crisis. In both crisis periods, we find that the estimated coefficient on the interaction between cross-border lending and the crisis variable is negative and significant. At the worst moment of the Lehman crisis, we find that the access to cross-border loans is reduced by up to an additional 37.22%. During the sovereign debt period we estimate the additional relative decline of cross-border loans of up to 35.08%.[23] Thus, the negative impact of the crisis shocks is substantially stronger for cross-border loans.

We also find that the crisis shocks lead to a reduction in the supply of cross-border loans when we control for borrower*time, lender*time, and borrower*lender fixed effects (Table 2, columns 4 and 8, which reports our benchmark regressions). Notice that all these estimations refer to the part of our sample that complies with the restrictions needed to identify the full set of fixed effects, and only includes loans between banks that actively traded both across borders *and* domestically before the onset of the recent financial crisis (as explained above in the section on empirical identification).[24] The estimated coefficients are statistically not different than those of the previous model despite a large increase in the R-squared (thus suggesting strong exogeneity to unobservable variables, following Altonji, Elder, and Taber 2005), and, second, they remain

[23] The absolute additional reduction during the Lehman crisis is of up to 3.16 percentage points, relative to the pre-Lehman average loan probability of 8.49 percentage points. The absolute additional change is of 1.20 percentage points during the sovereign debt crisis relative to the average pre-crisis loan probability of 3.42 percentage points.

[24] We keep the same number of observations in all the columns of the loan-level analysis to facilitate the comparison of the results depending on the different set of controls.

economically significant and large (an additional relative reduction for cross-border loans in access to interbank credit by 29.21% during Lehman and by 24.38% during the sovereign debt sample). All in all, the results suggest that the recent financial crisis shocks reduce the supply of interbank liquidity in the extensive margin of lending, with substantially stronger negative effects for cross-border loans, thereby impairing international financial integration.

In Table 3, we analyze the intensive margin of credit, i.e., volume and spread for the granted loans. From columns 1 and 6, we find that the crisis shock implies a reduction of credit volume that banks borrow in the interbank market, which is binding at the (borrower) bank level. During the height of each crisis, there is an overall 33.92% decrease in interbank borrowing during the Lehman period and a 28.84% decline during the sovereign debt crisis.

Columns 2 and 7 report the coefficients for the loan-level analysis tracing the crises' impact on cross-border versus domestic loan volumes. We find that the crisis shocks imply a stronger reduction of the supply of credit volume for the cross-border as compared with the domestic segment (for the same borrower on the same day, also adding lender*day and borrower*lender fixed effects). When considering the worst moments of the respective crisis periods, we find an additional reduction in cross-border versus domestic loan volumes by up to 12.45% during the Lehman crisis and by 10.04% during the sovereign debt period.

In columns 3–5 and 8–10 of Table 3, we show the same results for the spreads of granted loans. In columns 3 and 8, controlling for borrower fixed effects, we find that the sovereign debt crisis shock increases the cost of borrowing by 32.01 basis points at the borrower bank level (see column 8). However, in column 3 we find that during the Lehman crisis banks pay significantly lower spreads for overnight credit (i.e., interest rates are closer to the rate paid on excess reserves). This finding is in line with other studies that document for the period after the Lehman failure a decrease of the overnight rate while the Libor-OIS spread increased (e.g., Taylor and Williams 2009; ECB 2013). This is partly due to the decrease of the OIS rate in the second week after the Lehman's failure suggesting that the market was expecting monetary policy to reduce interest rates (Taylor and Williams 2009). So, in column 4, we restrict our analysis of the recent financial crisis on spreads to the first week after the Lehman failure (i.e., with 4 weeks before and 1 week after Lehman Brothers' failure) and find a positive and significant impact of the crisis on spreads at the bank level immediately after the Lehman shock.

Interestingly, our results on the loan-level analysis with the full set of fixed effects show that, during the Lehman sample, lenders charge to the same borrower on the same day significantly higher spreads for cross-border loans as compared with domestic loans during the crisis. Economically, this differential effect in the interest rate spread amounts to 6.97 basis points (column 5) at the worst moment of the crisis (or 6.92% when compared to the average spread of 1.01 percentage points before the Lehman failure). During the sovereign debt crisis, we find no significant *average* cross-border differential effect during the crisis (see column 9). However, once we allow for heterogeneous effects depending on borrower location, we find an additional increase of 13.61 basis points for cross-border loans to borrower banks headquartered in GIPS countries (see column 1 of Appendix Table A5 Panel B).

Overall, the results suggest that the recent financial and sovereign debt crisis shocks reduce the supply of interbank liquidity (credit supply) on the extensive and intensive margin of lending (access, volume, and spreads), with substantially stronger adverse effects for cross-border loans, thereby impairing international financial integration. Moreover, the effects are binding at the (borrower) bank level and are significant both for the Lehman and the sovereign debt crises. Importantly, despite of analyzing the less risky segment of just overnight loans (as compared to loans with longer-term maturities, which we analyze in Section 3.4.), the results are quantitatively strong, especially on access and volume. It is important to highlight that our baseline result holds after controlling for any unobserved time-varying borrower (and lender) heterogeneity through borrower*time (and lender*time) fixed effects, where time refers to daily fixed effects. Hence, unlike with aggregate or even bank-level data, we can control for any time-varying compositional differences in the sample of domestic vs. foreign borrowers; moreover, as compared with other loan-level data, our loans are identical standardized overnight deposits. Moreover, our results are based on an identification strategy that controls for time-varying borrower-specific credit quality changes. That is, changing borrower qualities and risks cannot drive our results.[25]

We next analyze whether the tightly identified differential effect (domestic versus cross-border) varies depending on borrower or borrower-country risk characteristics, or is independent

[25] In (unreported) robustness regressions, we find that our results become weaker once we exclude borrower*time fixed effects. This suggests (i) that borrower-specific credit quality changes over time affect interbank lending, and (ii) if not taken into account they blur the cross-border differential effect in interbank lending. This gives rise for our strong identification strategy in light of our overarching research question.

on their risk characteristics. Note that while we identify the average cross-border differential effect by comparing loan conditions to the same borrower on the same day by a foreign vs. domestic lender (borrower*time fixed effects), this differential effect might still be more or less pronounced depending on borrower characteristics.

To estimate the sensitivity of the cross-border differential effect during the crisis depending on debtor-bank characteristics, we interact crisis*cross-border with several borrower-specific variables, including borrower-country level characteristics. In Table 4, we interact crisis*cross-border with a set of variables. Our first variable is a binary variable that equals the value of 1 whenever the borrowing bank is headquartered in one of the GIPS countries, i.e., Greece, Ireland, Portugal, and Spain. This variable is a natural candidate as the sovereign debt crisis was centered on these countries, but for consistency in our analysis we also use this variable in the Lehman period. Second, we introduce an interaction with creditor rights index from La Porta et al (1998) and Djankov, McLiesh and Shleifer (2007) that measures the protection of creditor rights in the borrower country. Third, we interact our crisis*cross-border variable with the borrower-country's public debt as a fraction of the country's GDP. Fourth and fifth, we follow Houston, Lin, and Ma (2012) and consider the interaction of our crisis*cross-border variable with bank balance sheet characteristics. We collect the borrowing-bank's total assets and its leverage ratio (equity-to-total-assets). Based on these data we construct the dummy variable High Leverage Bank that equals one if the borrower has a leverage ratio above the median, and zero otherwise. Similarly, we compute the dummy variable Large Bank that equals one for banks with a total asset size above the median value, and zero otherwise.

Our results for the extensive margin, i.e., access to interbank loans (columns 1 and 4), suggest that the reduction of the supply of cross-border loans is independent of debtor bank characteristics, including country level ones.[26] While there are many different observable and unobservable factors that potentially might relate to the strength of the cross-border differential effect, we present in our baseline specifications only a combination of variables that the literature finds important in general. However, in robustness regressions, we have also checked the results against the inclusion of multiple other variables used in the literature such as the borrower-country's bank capital regulation, common language between the lender and borrower country (Rose 2004), on bilateral trust, biological distance, and differences in economic conditions (per

[26] Estimations with individual interaction terms are presented in Appendix Tables A3 through A5.

capita GDP) between the lender and borrower country (Guiso, Sapienza, and Zingales 2006, 2009), the degree of government bank ownership as well as trade flows between the two countries (Giannetti and Laeven 2012; Houston, Lin, and Ma 2012).[27] But in all cases, we do not find that the reduction of cross-border funding access is dependent on any of these borrower-specific variables, neither in the Lehman crisis nor in the sovereign debt crisis. Therefore, the dry-up of cross-border liquidity on the extensive margin is independent of debtor bank fundamentals.

In columns 2, 3, 5, and 6, we replicate the estimation for the intensive margin of credit, i.e., volume and spread, respectively. In column 2, we find that the cross-border differential effect in loan amounts during the Lehman crisis is more pronounced for highly leveraged foreign borrower banks. During the worst moment of the crisis, highly-levered borrowers experience an additional reduction in cross-border loan volumes by 18.6%.

From column 5, we find that during the sovereign debt crisis, the reduction in cross-border loan amounts is stronger for smaller foreign banks and stronger for banks headquartered in countries with high public debt/GDP, but especially stronger from GIPS-headquartered banks. For example, during the worst moment of the crisis, GIPS-headquartered borrower banks experience an additional contraction in loan volumes by 51.6% as compared with the general cross-border loan volume contraction. Creditor rights and high leveraged foreign borrower banks, however, leave the cross-border differential effect unaffected.

Overall, these results suggest that unlike the extensive margin of credit (access to interbank loans), the reduction in the supply of cross-border loan amount is affected by debtor bank characteristics, including country level ones where they are headquartered.

In columns 3 and 6, we find that during both the Lehman crisis and the sovereign debt crisis, the cross-border differential effect in spreads is stronger from GIPS-headquartered debtor banks. The estimates indicate an additional increase in spreads for cross-border loans by up to

[27] One may have the notion that national bail-out /banking resolution schemes could also affect the cross-border differential. For instance, until the ECB's single supervisory mechanism became effective in November 2014, bail-outs were decided and implemented nationally. In fact, the bail-out of the Venetian banks by the Italian government in summer 2017 shows that bail-outs during the SSM era may still be performed nationally. However, this should not affect our results for (at least) two reasons. First, heterogeneous bail-out /resolutions schemes are taken into account in our regressions by applying borrower*time fixed effects. Second, in case of a resolution, claims are recovered based on a priority principle (e.g., senior debt, junior debt, equity) rather than nationality of the claim holder. Especially, in the case of the euro area, an ex-ante discrimination based on nationality would not comply with the general idea of competitive and common markets.

16.9 and 9.08 basis points during the Lehman and sovereign crisis, respectively. Note that this is the additional increase in spreads for GIPS-headquartered borrowers as compared to the general increase in cross-border loan spreads during the crisis. Moreover, we find consistently across crises periods that lenders charge additionally higher rates on cross-border loans to larger banks. The borrower-country's creditor protection, its public debt/GDP, and borrowing bank's leverage leave the cross-border differential effects unaffected.

In robustness regressions, we find that the results for the intensive margin, i.e., both volume and spreads, are robust to the inclusion of other variables used in the literature (as previously discussed). In fact, the impact of GIPS-headquartered debtor banks strikes out as the most important variable affecting the cross-border differential in both loan amount and spreads during the sovereign period and in spreads during the Lehman period.

Therefore, in a next step, we examine if the significantly stronger cross-border differential effect for GIPS-headquartered borrowers for the intensive margin depends further on bank-level characteristics of GIPS borrowers. To that aim, we allow the effect of crisis*cross-border*GIPS-bank on loan volumes and spreads to be different for large GIPS-headquartered borrowers and for highly leveraged GIPS-headquartered borrowers. In Table 5, we only find that the differential effect on cross-border loan amount to GIPS-headquartered debtor banks is affected by higher leveraged borrowers during the sovereign debt crisis. Our estimate suggests that relative to the general contraction in cross-border loan volumes to GIPS-headquartered borrowers, highly levered GIPS-headquartered borrowers face an additional decline in cross-border volumes of up to 65.7% during the worst moment of the sovereign crisis (column 4). However, these effects are statistically significant only at the 10% level and we do not observe an additional differential effect for spreads. Similarly, during the Lehman crisis, the increase in cross-border spreads for GIPS-headquartered debtor banks is unaffected by further bank-level characteristics.

In sum, our previous results show that the crisis shocks reduce the supply of interbank liquidity, but especially the cross-border liquidity, thereby impairing international financial integration. Importantly, in the extensive margin (access to interbank loans) differently from the intensive margin (volume and price), the reduction of the supply of cross-border loans is independent of debtor bank characteristics (i.e., risk and quality), including the country level ones where the debtor bank is headquartered.

Interestingly, on the intensive margin, already during the Lehman crisis, GIPS-headquartered debtor banks pay higher spreads for cross-border liquidity. The cross-border liquidity crunch for GIPS-borrowers intensifies during the sovereign debt crisis, when GIPS-headquartered debtor banks also obtain substantially smaller cross-border loan amounts in addition to paying higher spreads on these international loans. In addition, we also find that the reduction of cross-border loan amount to GIPS-headquartered banks is particularly strong for highly-leveraged GIPS-headquartered borrowers.

3.3. What is Cross-Border? Lender Location versus Nationality

Our baseline results consistently (across margins and crises samples) show that the interbank liquidity crunch during crises periods is more pronounced in the cross-border segment; in particular, for GIPS-headquartered debtor banks during the sovereign crisis. This finding is consistent with theory (e.g., Freixas and Holthausen 2005), arguing that asymmetric information problems are stronger if the lender is located in a different country than the borrower, especially during crises times.

To further substantiate the role of asymmetric information problems as the key driver of the documented cross-border liquidity crunch, we next test whether the documented cutback is related to either the lender bank's location or its nationality (relative to the borrower). That is, in a next step we examine why during crises times, cross-border liquidity dries up. Is the cutback in lending driven by foreign banks located in a foreign country as opposed to foreign banks located in the same country as the borrower (location)? Or is it rather because all foreign banks withdraw funding from domestic borrowers (nationality)? For example, we analyze whether Deutsche Bank in Frankfurt and Deutsche Bank in Spain differentially provide liquidity to Banco Santander in Spain during crises periods. To do so, we define a dummy variable that equals the value of one for domestic loans where the lender is a foreign bank but located in the same country than the borrower, and zero otherwise. Moreover, we refine our cross-border dummy variable and set it to one for cross-border loans where the lender is a foreign bank (as opposed to a lender that has a bank-parent with the same nationality as the borrower bank), and zero otherwise.

We provide results on lender location versus nationality in Table 6. The estimations follow our benchmark approach with a full set of borrower*time fixed effects, lender*time fixed

effects, and borrower*lender fixed effects. Columns (1) and (4) show that, for the extensive margin, foreign banks in a different location than the borrower cut back on lending significantly more than domestic banks during both crisis periods. This result effectively resembles our main finding from the previous tables that cross-border credit (defined by location) dries up.[28] However, in stark contrast to this result, foreign lenders that are *based in the same country* than the borrower do *not* cut back lending differentially than domestic banks during the crisis.[29]

Similarly, in columns (2) and (5), we find that, during both crises periods, on the intensive margin, foreign banks strongly and significantly decrease their loan volume to borrowers in a different location compared to local, domestic banks. Our estimated coefficient for the Lehman period is roughly similar (in absolute values) than in Table 3, column (2), where we also consider cross-border loans by lender banks of the same parent nationality than the borrower. During the Lehman crisis, the point estimate also indicates that foreign banks reduce loan volumes to domestic borrowers compared to local, domestic banks, although the effect is only marginally significant (at 10% level of significance). On the other hand, during the Sovereign crisis, foreign banks even increase lending to borrowers that are located in the same country (compared to local, domestic banks), suggesting a substitution from cross-border to domestic lending by foreign banks. As a result, when we compare cross-border loans by foreign lenders with the benchmark group of domestic loans by domestic banks, the estimated coefficient becomes larger in absolute values indicating a reduction of up to 43.89% during the crisis (compared with an estimate of -10.04% in Table 3, column 7, which is relative to *all* domestic loans).

Column (3) and (6) show the results for the spreads of granted loans. As before, we find that cross-border loans by foreign banks trade at substantially higher spreads during the crisis period, both during the Lehman and Sovereign period. (Similar to our results in Table 3, the coefficient estimates for the Sovereign period correspond to the reported effects for GIPS-headquartered borrowers.) Again, the insignificant coefficient estimate on the interaction "Crisis

[28] In fact, in (unreported) robustness regressions, we can show that all our results can be replicated with this definition of cross-border loans suggesting that location is the key driver of cross-border credit crunch during crises times.

[29] For a clean identification, all specifications in Table 5 include as controls interaction terms between the crisis variable and a dummy variable for cross-border loans from lenders with the same bank-parent nationality than the borrower bank. The output is omitted to avoid cluttering.

* Domestic (foreign lender)" indicates that, unlike foreign banks in a different location, domestic loan by foreign lenders do not trade at higher rates than domestic loans by local, domestic banks.

Overall, these results show that the cross-border credit crunch during crisis is driven by lender location rather than lender nationality. In that sense, not foreign lenders cut back liquidity more strongly, but only those foreign lenders that are based in a different country. This is consistent with the notion that these banks have noisy information about borrower quality, local economic conditions, and the general local institutional setup, including bailout outcomes and resolution schemes and thus withdraw from the market and delegate decisions to the local bank. These results are in favor of theories suggesting asymmetric information problem to be at the core of the documented cross-border liquidity credit crunch.[30]

3.4. Cross-Border Credit Crunch in the Term Segment

Previous results are based on overnight loans only, given that the overnight segment of the interbank market is very active—even during crisis periods—and thus allows comparing truly identical loans, i.e., overnight-uncollateralized-euro-denominated loans to the same borrower on the same day. However, our dataset also contains loans with maturity longer than overnight (henceforth, term loans), which allows us to analyze the reduction of term lending during the crisis, in particular, in the cross-border segment. In light of the results presented in the previous subsection, we would expect that our reported effects are stronger in the longer-term segment (given that shorter maturity is safer and can be seen a substitute for collateral relative to term loans), if asymmetric information problems are at the core of the documented cross-border liquidity crunch during crises.

Figure 2 plots the turnover in the overnight segment and the term segment during the Lehman period. The figure shows a strong and sudden collapse of interbank lending in the term segment of about 80 percent after Lehman's failure. The freeze in term lending is accompanied by an initial increase in overnight lending (suggesting a substitution from the less liquid and thus riskier term segment toward the more liquid and less risky overnight segment). However, the

[30] In that respect, our finding that, for the intensive margin, the cross-border differential effect is stronger for low-quality borrowers (e.g., high leverage, GIPS borrowers), suggests that asymmetric information problems become more severe if credit quality deteriorates as often argued in the literature (e.g., Heider, Hoerova, and Holthausen 2015).

overnight lending itself also starts to decrease in the period subsequent this substantial drop in term lending. Interestingly, Appendix Figure A1 shows that the term segment did not recover in the years following Lehman's failure, unlike the overnight segment. This finding highlights the role and importance of overnight lending for euro area interbank money markets, which is also why, in addition for a clean identification, we focus in our main analysis on overnight loans.

In Table 7, we study the collapse in term lending after Lehman's failure in more detail, and examine, in particular, whether the dry-up was more pronounced for the cross-border term segment. Our regression setup is (once again) consistent with our loan-level analysis presented in Tables 2 and 3, but now also includes term loans in addition to overnight loans. That is, for the bank-pairs in our overnight loan dataset, we now add interbank loans with maturity larger than overnight; hence, observations are not at the lender-borrower-day-maturity level.[31] To assess the differential reaction of cross-border loans to the crisis in the term versus overnight segment, we include the triple interaction "Crisis * Cross-border * Term" as our main independent variable of interest. That is, we expand our main variable of interest in our baseline regressions, "Crisis * Cross-border", along the term dimension, which allows us to study whether the cross-border credit crunch during the crisis is more pronounced in the term segment. Similar to our benchmark results, all specifications include borrower*time fixed effects, lender*time fixed effects, and borrower*lender fixed effects.

In columns (1) and (2), we present results for the extensive margin of credit. The negative coefficient estimate on the triple interaction shows that the cross-border credit crunch during the crisis is significantly stronger in the term segment of the interbank market. In column (2), we include, in addition to our baseline controls, Cross-border * Time fixed effects, Cross-border * Term fixed effects, and Term * Time fixed effects, thereby only focusing on the differential reaction of cross-border credit in the term segment during the crisis, while netting out general time-variation in cross-border and term liquidity, as well as a different maturity structure in the cross-border segment. In column (2), the estimated coefficient indicates a strong differential

[31] More precisely, we construct our measure of the extensive margin in the full sample of loans as follows. For each bank pair, in each maturity, we construct a dummy variable that equals one if the pair trades on a given day, and zero otherwise. Bank pairs that are not trading in a given maturity (and thus have only zeros in the dummy variable) are discarded from the sample. For the intensive margin, we measure volume as the logarithm of the respective loan amount (in EUR millions), while the interest rates spread refers to the difference between the interest rates on the loan and the prevailing deposit facility rate (in case of multiple loans between bank pairs on the same day in the same maturity, we aggregate volumes and use the quantity-weighted interest rate spread). This is in analogy to our approach above (compare Section 3.1)

reduction of about up to 16 percentage points during the crisis, which is economically very significant.

Columns (3) and (4) present results for the amount of granted loans. Similar to access, we find a significantly stronger reduction in cross-border loan amounts for term loans when the crisis intensifies. For a one-standard-deviation (0.32) increase in our crisis measure, we estimate, based on model (4), an additional reduction in cross-border term loan volumes of 53.7 percent relative to overnight loans. In columns (5) and (6), we also show that spreads of granted loans increase substantially more in the cross-border term segment during the crisis. Our tightly identified estimates from column (6) point toward a differential increase of up to 50 basis points during the worst moment of the crisis.

In sum, these results show that the cross-border liquidity crunch during crisis is economically stronger in the term interbank segment. Moreover, they support our previous finding, i.e. that the results presented here are consistent with the notion that asymmetric information problems are at the core of the documented cross-border credit crunch during both crises periods.

3.5. IMPACT OF EXPANSIONARY MONETARY POLICY

Overall, our basic results suggest that the crisis shocks imply a reduction of the supply of credit with a stronger negative differential effect on the supply of cross-border as compared to domestic loans. Expansionary monetary policy via the credit channel (e.g., Bernanke and Gertler 1995; Bernanke 2007) may relax financial constraints by reducing the crisis severity in general and also by relaxing the financial constraints of riskier loans (e.g., a cross-border loan in crisis times).[32] Moreover, nonstandard monetary policy has been the most important policy to combat illiquidity in the euro area. Therefore, a crucial question that arises is whether nonstandard, expansionary monetary policy helps to mitigate credit supply restrictions, notably cross-border frictions, thereby helping to promote international financial re-integration in crisis times.

To identify the effect of expansionary monetary policy, we continue exploiting the data at the lender-borrower-day level, but now with a short time window of +/– 1 week around the main monetary policy measures undertaken in each crisis period: (i) the fixed-rate full allotment

[32] As we have seen, there are frictions between foreign and local lenders that make cross-border loans riskier than domestic ones for lenders.

(FRFA) in October 2008 (the Lehman period); (ii) the first three-year long-term refinancing operations (LTRO) during the sovereign debt period in December 2011 and the second one in February 2012; and (iii) the Draghi's "whatever-it-takes" speech in July 2012 with the related announcement of the outright monetary transaction (OMT) policy by the Eurosystem in August 2012.[33] We use a difference-in-differences approach for the analysis of the impact of the different monetary policy changes:

$$Loan_{i,j,t} = \beta \cdot Monetary\ Policy_t \cdot Cross\text{-}border_{i,j} + \alpha_{j,t} + \alpha_{i,t} + \alpha_{i,j} + \varepsilon_{i,j,t} \qquad (3)$$

where the dependent variable is the interbank overnight loan condition granted to borrower *j* by lender *i* at day *t*. Monetary Policy is a binary variable that equals the value one on any day in the week after the key public policy change, and zero in the week before. That is, for the Lehman period, during the +/– 1 week window, the Monetary Policy dummy equals the value of one in the week after the implementation of the FRFA policy on October 15, 2008, and zero on the days prior to that date. For the sovereign debt crisis period, we independently study the effect of the two LTROs using the Monetary Policy dummy that takes the value of one in the week after December 21, 2011, for the first LTRO, and the week after February 29, 2012, for the second LTRO, and zero for the week before, respectively. To study the effect of Draghi's "whatever-it-takes" speech, we define the dummy variable such that it takes the value of one in the week after July 26, 2012, and zero in the week before. Moreover, because in the week after Draghi's speech, the Eurosystem announced its OMT program on August 2, 2012, we also consider another regression where we take the week before Draghi's speech and the week after the OMT announcement (thus leaving out the week from July 28 through August 2).[34]

For empirical identification, we use borrower*time fixed effects, lender*time fixed effects, and borrower*lender fixed effects, where time is daily, thus mimicking the strong identification from our benchmark equation (1). However, this identification strategy can only be

[33] The outright monetary transaction (OMT) is a program of the Eurosystem under which the euro area system of central banks purchases in secondary markets bonds issued by Eurozone member-states under strong conditionality. In (unreported) robustness analyses, we use the shadow rate from Wu and Xia (2016) and show that these monetary policy measures affect the shadow rate in the euro area in a significant and plausible way.

[34] We use for the FRFA and LTRO measures the actual implementation day, because those monetary policy measures were directly impacting the interbank market through central bank liquidity allocation. We use the announcement day of the OMT instead, because the OMT was primarily focused on sovereign yields, thus only affected banks indirectly and, in addition, the OMT program was never actually used (i.e., there has not been an actual liquidity provision as compared to the FRFA and LTROs). The Draghi's "whatever-it-takes" speech in 2012 was unanticipated, came by large surprise and affected markets immediately and persistently, see e.g., Financial Times on 'ECB "read to do whatever it takes'", on July 26, 2012 (available at: https://www.ft.com/content/6ce6b2c2-d713-11e1-8e7d-00144feabdc0).

employed for the extensive margin (access) as, within a very short window of time (as in this case for the identification of monetary policy changes), the requirements needed for the identification of the fixed effects cannot be met for the intensive margin of credit (volume and spread) due to the lack of statistical power. We therefore study the intensive margin with a specification including only borrower and lender fixed effects (note, however, that in Table 2 we find that the estimated cross-border effects do not change if we add the strongest set of fixed effects). We focus in all our monetary policy analysis on the overnight segment given that the term segment collapsed completely after Lehman's failure and has not recovered since then over our sample.

In Table 8, Panel A, we investigate the effect of expansionary monetary policy on the access to cross-border credit. In column 1, we find that the FRFA policy improves the cross-border funding access during the crisis. The effect of the improvement amounts to 1.59 percentage points, thus suggesting a relative improvement for cross-border loans of 29.18% when compared to the average loan probability of 5.43 percentage points in the week before the policy intervention. Our results on the effect of the first LTRO in December 2011 suggest no effect on the differential access in cross-border; however, the implementation of the second LTRO in February 2012 significantly improves the cross-border loans by 1.93 percentage points, (59.19% when compared to the average loan probability of 3.27 in the week before the LTRO).[35]

The Draghi speech to do "whatever-it-takes" to save the euro moreover improves the supply of access to cross-border loans by 2.34 percentage points. When compared to the average loan probability of 3.61 percentage points in the week before the speech, this amounts to a relative improvement of 64.84%. In the alternative specification, when we look at the change during the week after the OMT announcement on August 2, 2012, as compared to the week before the Draghi speech, we even find a stronger improvement of cross-border access of 3.40 percentage points or 94.17% as compared to the week before the speech. In sum, the overall results for access suggest a strong impact of monetary policy for the cross-border segment. However, effects are similar for riskier banks (e.g. highly-leveraged GIPS-borrowers), see Appendix Table A6.

In Table 8, Panel B and C, we also find that monetary policy affects the intensive margin

[35] The first LTRO took place on December 21, 2011, and provided 489.2 EUR billion. The second operation took place on February 29, 2012, and provided 529.5 EUR billion.

of credit overall, but not for cross-border loans, thus showing that monetary policy has limitations in ameliorating the financial integration problems in crisis times.[36] In particular, within the intensive margin, the effects are stronger for reducing spreads than for increasing volume. We find that the FRFA decreases spreads by 15.29 basis points (but not volumes), which implies an improvement of spreads by 34.53% when compared to the average spread before the FRFA. However, there is *no* differential effect depending on cross-border versus domestic loans (despite that the crisis shocks implied worse effects on cross-border loans). In addition, we find that the first LTRO increases the overall borrowing amount by 14.77% and reduces spreads by 13.20 basis points. Economically, the improvement of interbank spreads corresponds to a relative decline in spreads by 34.73% (when compared to the average spread in the week before the first LTRO). Yet, there is *no* differential effect depending on cross-border for volumes (the first and second coefficients add up to zero), while for spreads we find a small improvement for domestic as compared to cross-border loans. All in all, different from the extensive margin (access to liquidity), in the intensive margin we do not find that expansionary monetary policy improves more the cross-border (relative to the domestic) segment, despite that the cross-border margin was more negatively affected by the crisis.

We do not find a significant effect of the Draghi speech on volumes or spreads (differently than for access). However, after the related OMT announcement, we find an improvement of overall spreads by 10.04% (when compared to the average spread before the Draghi speech). It is interesting to note that the OMT—both the Draghi speech as well as the announcement by the Eurosystem—improves (private) interbank liquidity despite that there was no actual injection of public liquidity, just the possibility of using this policy tool.

In sum, all these results highlight the positive role of monetary policy to improve interbank liquidity during crisis times. Yet, our findings also suggest that there are significant limitations to the effectiveness of monetary policy, especially on the cross-border segment to deliver strong international financial re-integration.

4. CONCLUSION

In a seminal paper, Afonso, Kovner, and Schoar (2011) do not find a freeze in the U.S.

[36] Both in the extensive and intensive margin, we do not find further differential effect for the cross-border segment along the crisis depending on borrower bank risk or location, i.e., GIPS- versus non-GIPS-headquartered banks (not reported).

unsecured interbank market around the time of the Lehman Brothers' bankruptcy. More recently, Pérignon, Thesmar, and Vuillemey (2017) do not find any market-wide freeze during the 2008–2014 period in the European market of unsecured certificates of deposits. In this paper, we study whether there is a freeze in the *cross-border* unsecured interbank liquidity. In particular, we analyze whether (and how) the recent financial and sovereign debt crises affect international financial integration, and also the role of nonstandard monetary policy in promoting international financial integration in crisis times.

As we argue in the paper, the euro area interbank market is an excellent platform for identification and for economic analysis. In particular, we exploit the euro area interbank market data in conjunction with the Lehman and sovereign debt shocks and the main, new non-standard monetary policy measures by the Eurosystem. Moreover, our empirical strategy relies on analyzing interbank loan terms for (identical) overnight loans in the central bank payment system to the same borrower on the same day, by domestic versus foreign lenders.

We find that the recent financial and sovereign debt crisis shocks strongly reduce the supply of interbank liquidity, in both the extensive and intensive margins, with substantially stronger negative effects for cross-border loans (a maximum of 29%), thereby impairing international financial integration. That is, comparing the same borrower on the same day, the foreign (as compared to the domestic) lender grants less interbank loans as the crisis intensifies; and conditioning on granting the overnight loan, the foreign lender reduces the loan amount and increases the loan spread. Moreover, the impairment of cross-border liquidity is quantitatively stronger on volumes than on pricing. These effects are even more pronounced for the term segment that, in response to the Lehman crisis shock, collapses and does not recover in the period thereafter.

Importantly, we show that the documented cross-border liquidity crunch during the recent financial and sovereign debt crises is driven by a reduction of lending by foreign banks that are *located* in a *different* country than the borrowing bank. In contrast, we do not find a strong contraction in liquidity supply by foreign banks that are *located* in the *same* country than the borrowing bank; instead, those foreign banks behave very similar to domestic banks.

Moreover, on the extensive margin, we find that the dry-up of cross-border liquidity is independent of debtor bank fundamentals. Differently, on the intensive margin, cross-border credit conditions depend on the risk of borrower banks. Interestingly, GIPS-headquartered debtor

banks already suffer in the Lehman crisis, but effects are stronger in the sovereign debt crisis, especially for riskier GIPS banks (with a reduction of 66% in loan volumes). Therefore, the (geographical) market segmentation is different for the extensive versus intensive margin of lending. Finally, we find that expansionary nonstandard monetary policy (fixed-rate full allotment, LTROs, and Draghi's OMT "whatever-it-takes") partly mitigates some of the (private) interbank liquidity supply restrictions during the crisis, but this public policy that provides public liquidity has significant limitations on delivering strong cross-border financial re-integration in the market for private liquidity.

Our results have two important policy implications. First, they suggest that despite an integrated currency union and a common interbank payment system, among many other policy initiatives to foster strong financial integration in the Euro Area, the problem of asymmetric information can act as a limit for financial markets to become fully integrated. Second, our results give rise to initiatives that may motivate a higher participation by foreign banks in local markets through their local offices instead of relying on cross-border relationships to overcome the adverse effects of asymmetric information during uncertain times. In this regard, our results are in favor of recent claims to foster stronger financial integration in European capital markets, see e.g., Nouy (2018).

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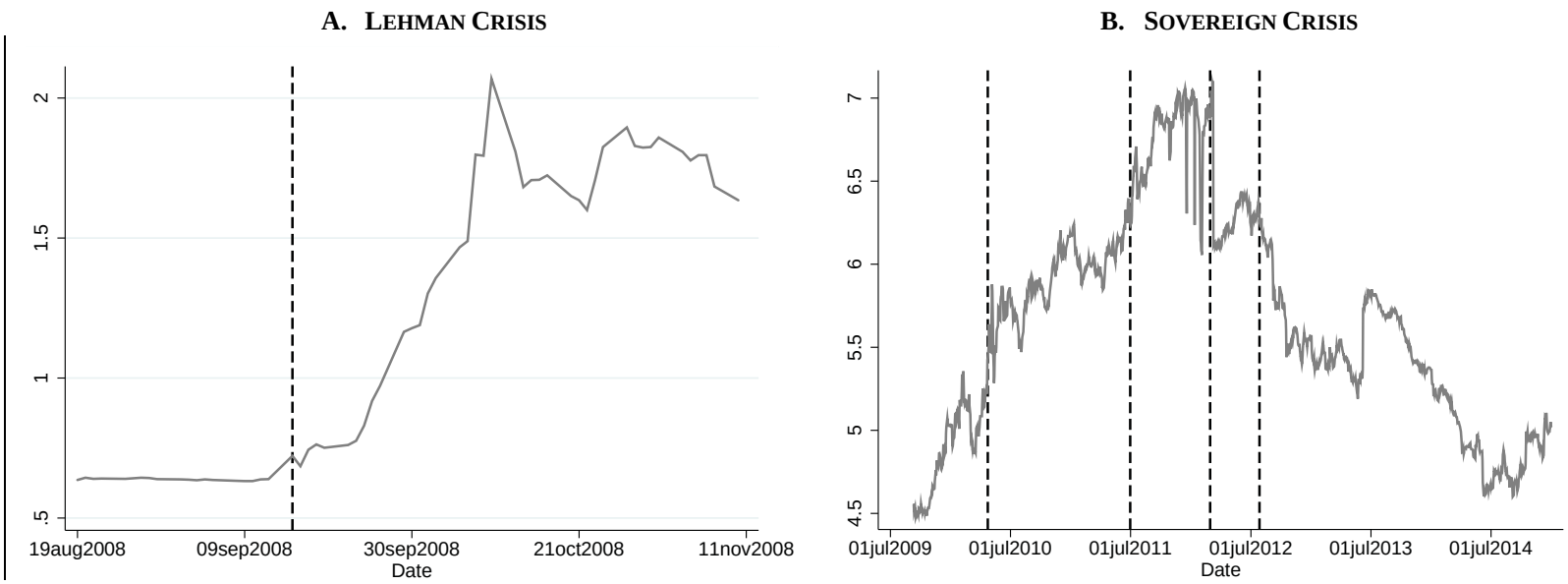
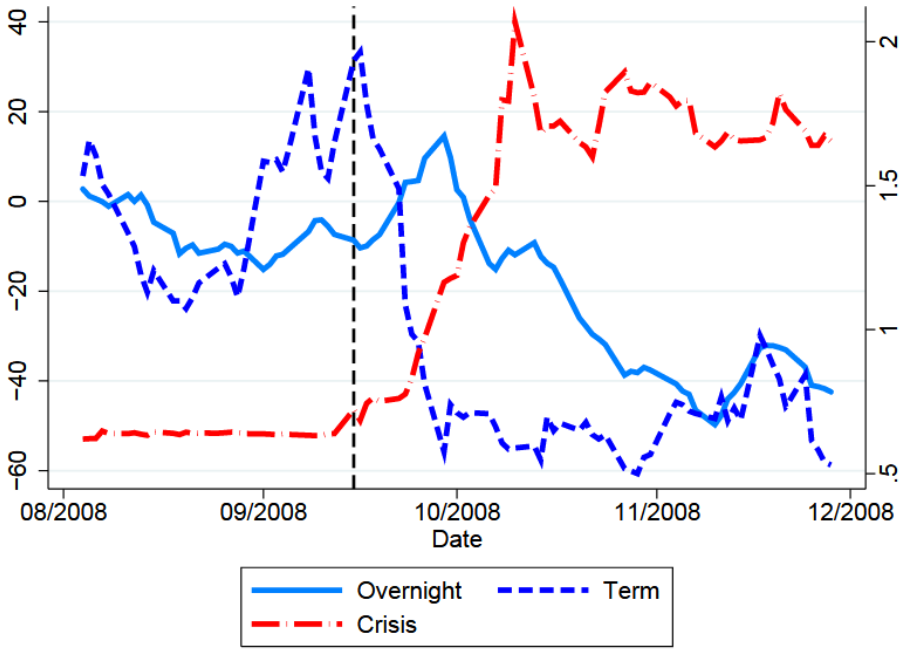
FIGURE 1: THREE-MONTH EURIBOR-OIS SPREAD AND MEAN PERIPHERY CDS DURING THE CRISIS



This figure shows our crisis measures for the Lehman crisis and sovereign debt crisis period, respectively. We define 'Lehman Crisis' (August 18, 2008, to November 9, 2008, daily frequency), and 'Sovereign Crisis' (July 1, 2009, to December 31, 2014, daily frequency). Subfigure (a) shows the difference (in percentage points) between the three-month Euribor rate and the correspondingly-dated overnight index swap (OIS) rate during the Lehman crisis sample. The dashed vertical line refers to September 15, 2008, i.e., the day on which Lehman Brothers filed for bankruptcy. Subfigure (b) plots the average of the logarithm of the five-year periphery country CDS spreads (in basis points). The first dashed vertical line denotes April 23, 2010, the day the Greek government activated the financial support mechanism. The second dashed vertical line refers to June 30, 2011, when market analysts became increasingly worried that Spain could keep refinancing its debt burden. The third dashed vertical line represents the second three-year LTRO on February 29, 2012, while the last dashed vertical line denotes the Draghi's "whatever-it-takes" speech on July 26, 2012.

FIGURE 2: OVERNIGHT VERSUS TERM INTERBANK LENDING AMOUNT AROUND LEHMAN



This figure shows the aggregate daily lending amount during the Lehman sample for both the overnight (solid blue line, left axis) and term (dashed blue line, left axis) segment for the period from August 1, 2008 to December 31, 2008. 'Term' lending relates to transactions with maturity larger than one week. All three series are expressed as percentage deviations from the mean value of each respective series during the pre-Lehman period from August 1, 2008 to September 12, 2008. 'Crisis' denotes the three-month Euribor-OIS spread (long-dashed red line, in % on the right axis). All series (except 'Crisis') are smoothed with a 10-day moving average. The vertical dashed line corresponds to September 15, 2008, when Lehman Brothers filed for bankruptcy.

TABLE 1: SUMMARY STATISTICS

	Lehman Crisis					Sovereign Crisis				
Dependent Variable:	**Mean**	**Median**	**Std**	**p(10)**	**p(90)**	**Mean**	**Median**	**Std**	**p(10)**	**p(90)**
Access	6.557	0.000	24.752	0.000	0.000	2.170	0.000	14.569	0.000	0.000
Loan Amount	152.960	90.000	241.722	15.000	400.000	183.812	75.000	317.623	34.000	500.000
Amount	4.328	4.500	1.219	2.708	5.992	4.347	4.318	1.320	2.708	6.215
Spread	0.841	1.000	0.360	0.200	1.110	0.224	0.130	0.231	0.020	0.550
	Lehman Crisis					**Sovereign Crisis**				
Independent Variable:	**Mean**	**Median**	**Std**	**p(10)**	**p(90)**	**Mean**	**Median**	**Std**	**p(10)**	**p(90)**
Euribor-OIS (3M)	0.250	0.080	0.320	0.000	0.810					
Mean Periphery CDS (log)						0.490	0.520	0.240	0.140	0.800
Cross-border	0.491	0.000	0.500	0.000	1.000	0.382	0.000	0.486	0.000	1.000
GIPS Bank	0.162	0.000	0.369	0.000	1.000	0.071	0.000	0.258	0.000	0.000
Creditor Rights	2.110	2.000	0.837	1.000	3.000	2.253	2.000	0.880	1.000	3.000
Public Debt	72.929	64.400	24.891	35.500	99.800	88.070	79.000	20.427	72.400	112.500
Large Bank	0.660	1.000	0.474	0.000	1.000	0.618	1.000	48.590	0.000	1.000
High Leverage Bank	0.364	0.000	0.481	0.000	1.000	0.496	0.000	0.500	0.000	1.000

This table reports descriptive statistics of the main variables used in the paper, across two sub-periods. We define 'Lehman Crisis' (August 18, 2008, to November 9, 2008, daily frequency), and 'Sovereign Crisis' (July 1, 2009, to December 31, 2014, daily frequency). 'Access' denotes the extensive margin of credit. 'Loan Amount' reflects the loan volume in EUR million, 'Amount' refers to the logarithm of 'Loan Amount'. 'Spread' reflects the difference (in percentage points) between the interest rate of a loan and the interest rate paid on excess reserves (IOER). For the extensive and intensive margin, we have 188,160 and 7,348 observations during the Lehman crisis, and 4,252,416 and 38,294 observations during the sovereign debt crisis, respectively. Summary statistics for independent variables refer to sample for intensive margin. 'Cross-border' is a dummy variable that equals one if lender bank and borrower bank are headquartered in different countries, and zero otherwise. 'Euribor-OIS (3M)' refers to the spread between the three-month Euribor rate and the correspondingly-dated overnight index swap (OIS) rate (in percentage points). 'Mean Periphery CDS' is the average of the logarithm of the five-year credit default swap (CDS) spread of the periphery countries (in basis points). The definition of 'GIPS Bank', 'Creditor Rights', 'Public Debt', 'Large Bank', and 'High Leverage Bank' can be found in the Appendix Table A1. We scaled our crisis variables (Euribor-OIS spread, and mean (log) periphery CDS) such that the lowest value in each subsample equals zero, and the highest value equals one. The summary statistics for cross-border versus domestic are reported separately in the appendix.

TABLE 2: CROSS-BORDER DIFFERENTIAL IN ACCESS DURING THE CRISIS

	Lehman Crisis				Sovereign Crisis			
	Dependent Variable: Access							
	Bank Level	Loan Level			Bank Level	Loan Level		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crisis	–2.8978***				–1.3402**			
	(0.69)				(0.67)			
Cross-border		–3.8619***	–2.1072***			–1.9204***	–1.8213***	
		(0.45)	(0.60)			(0.19)	(0.19)	
Crisis * Cross-border			–3.1626***	–2.4846***			–1.2007***	–0.7925**
			(0.74)	(0.83)			(0.34)	(0.40)
Time FE	No	Yes	Yes	-	No	Yes	Yes	-
Borrower FE	Yes	Yes	Yes	-	Yes	Yes	Yes	-
Lender FE	No	Yes	Yes	-	No	Yes	Yes	-
Borrower * Time FE	No	No	No	Yes	No	No	No	Yes
Lender * Time FE	No	No	No	Yes	No	No	No	Yes
Pair FE	No	No	No	Yes	No	No	No	Yes
Observations	60,180	188,160	188,160	188,160	1,360,068	4,252,416	4,252,416	4,252,416
R-squared	0.659	0.096	0.096	0.360	0.384	0.078	0.078	0.306

This table shows the impact of the financial crisis on the extensive margin of credit, by domestic versus foreign lenders, across two sub-periods. We define 'Lehman Crisis' (August 18, 2008, to November 9, 2008, daily frequency), and 'Sovereign Crisis' (July 1, 2009, to December 31, 2014, daily frequency). The dependent variable in columns 1 and 5 is at the borrower bank-time level and equals one if borrower bank j obtained an overnight loan on day t, and zero otherwise. The dependent variable in columns 2–4 and 6–8 is at the borrower-lender-time level and equals one if lender bank i grants an overnight loan to borrower bank j on day t, and zero if no loan is granted. For a thorough description of our dependent variable, refer to Section 3. 'Cross-border' is a dummy variable that equals one if lender bank i and borrower bank j are headquartered in different countries, and zero otherwise. 'Crisis' refers to the Euribor-OIS spread (3M) for the Lehman crisis and to the mean (log) periphery CDS spread for sovereign debt crisis. For the sake of representation, we have multiplied the estimated coefficients by 100. We scaled our crisis variables (Euribor-OIS spread, and mean (log) periphery CDS) such that the lowest value in each subsample equals zero, and the highest value equals one. The definition of our main variables can be found in the Appendix Table A1. Fixed effects are included ('Yes'), are not included ('No'), or are spanned by another set of fixed effects ('-'). Where possible, a constant is included but its estimated value is not shown to avoid cluttering. Robust standard errors are presented in parentheses. *** p<.01, ** p<0.05, * p<0.1.

TABLE 3: CROSS-BORDER DIFFERENTIAL IN AMOUNT AND SPREAD DURING THE CRISIS

	Lehman Crisis					Sovereign Crisis				
	Dependent Variable:									
	Amount		Spread			Amount		Spread		
	Bank Level	Loan Level	Bank Level		Loan Level	Bank Level	Loan Level	Bank Level	Loan Level	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Crisis	–0.3392***		–0.7989***	0.8532***		–0.2884*		0.3201***		
	(0.11)		(0.04)	(0.13)		(0.16)		(0.03)		
Crisis * Cross-border		–0.1245**			0.0697***		–0.1004**		0.0062	0.1361***
		(0.06)			(0.02)		(0.05)		(0.01)	(0.04)
Time FE	No	-	No	No	-	No	-	No	-	-
Borrower FE	Yes	-	Yes	Yes	-	Yes	-	Yes	-	-
Lender FE	No	-	No	No	-	No	-	No	-	-
Borrower * Time FE	No	Yes	No	No	Yes	No	Yes	No	Yes	Yes
Lender * Time FE	No	Yes	No	No	Yes	No	Yes	No	Yes	Yes
Pair FE	No	Yes	No	No	Yes	No	Yes	No	Yes	Yes
Observations	1,941	7,348	1,941	901	7,348	13,368	38,294	13,368	38,294	38,294
R-squared	0.650	0.919	0.578	0.216	0.630	0.631	0.862	0.200	0.947	0.947

This table shows the impact of the financial crisis on the intensive margin of credit, by domestic versus foreign lenders, across two sub-periods. We define 'Lehman Crisis' (August 18, 2008, to November 9, 2008, daily frequency), and 'Sovereign Crisis' (July 1, 2009, to December 31, 2014, daily frequency). The dependent variable in columns 1 and 6 is at the borrower bank-time level and equals the (log) total amount borrowed by bank j on day t. The dependent variable in columns 2 and 7 is at the borrower-lender-time level and equals the (log) amount of the loan lender bank i grants to borrower bank j on day t. The dependent variable in column 3–4, and 8 is at the borrower bank-time level and equals the difference (in percentage points) between the volume-weighted interest rate of the amount borrowed by bank j on day t and the interest rate paid on excess reserves (IOER) on day t. In column 4, we restrict the sample to one week after Lehman's failure to account for market expectations on monetary policy interest rate cuts (sample runs from August 18, 2008 to September 19, 2008, daily frequency). The dependent variable in columns 5, 9, and 10 is at the borrower-lender-time level and equals the spread between the interest rate of the loan lender bank i grants to borrower bank j on day t and the interest rate paid on excess reserves (IOER) on day t. For a thorough description of the dependent variables, refer to Section 3. In column 10, the coefficient for 'Crisis * Cross-border' is the estimated effect for GIPS banks from column 1 of Appendix Table A5 Panel B, where we include the additional term 'Crisis * Cross-border * GIPS Bank'. 'Cross-border' is a dummy variable that equals one if lender bank i and borrower bank j are headquartered in different countries, and zero otherwise. 'Crisis' refers to the Euribor-OIS spread (3M) for the Lehman crisis and to the mean (log) periphery CDS spread for sovereign debt crisis. We scaled our crisis variables (Euribor-OIS spread, and mean (log) periphery CDS) such that the lowest value in each subsample equals zero, and the highest value equals one. The definition of our main variables can be found in the Appendix Table A1. Fixed effects are included ('Yes'), are not included ('No'), or are spanned by another set of fixed effects ('-'). Where possible, a constant is included but its estimated value is not shown to avoid cluttering. Robust standard errors are presented in parentheses. *** p<.01, ** p<0.05, * p<0.1.

TABLE 4: HETEROGENEITY IN CROSS-BORDER DIFFERENTIAL

	Lehman Crisis			Sovereign Crisis		
	Dependent Variable:					
	Access	Amount	Spread	Access	Amount	Spread
	(1)	(2)	(3)	(4)	(5)	(6)
Crisis * Cross-border * GIPS Bank	-0.4988	-0.1324	0.1651***	-1.0730	-0.5155**	0.0908*
	(-0.15)	(-0.95)	(2.93)	(-0.80)	(-2.35)	(1.66)
Crisis * Cross-border * Creditor Rights	1.2343	0.0073	-0.0117	-0.0806	-0.0266	-0.0004
	(1.30)	(0.16)	(-0.90)	(-0.21)	(-0.69)	(-0.05)
Crisis * Cross-border * Public Debt	-0.0561	-0.0004	0.0013	-0.0023	-0.0057*	-0.0009
	(-1.05)	(-0.25)	(1.62)	(-0.12)	(-1.82)	(-0.68)
Crisis * Cross-border * Large Bank	0.6150	-0.0824	0.0935***	-0.5147	0.1891*	0.0342**
	(0.33)	(-0.83)	(2.65)	(-0.58)	(1.82)	(2.47)
Crisis * Cross-border * High Leverage Bank	2.3448	-0.1860*	0.0178	-1.1415	0.1277	-0.0339
	(1.39)	(-1.89)	(0.46)	(-1.54)	(1.34)	(-1.38)
Lower Order Interaction Terms	Yes	Yes	Yes	Yes	Yes	Yes
Borrower * Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Lender * Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	188,160	7,348	7,348	4,252,416	38,294	38,294
R-squared	0.360	0.916	0.586	0.306	0.862	0.947

This table shows the heterogeneity in the cross-border differential in the extensive and intensive margin of credit during the Lehman crisis (August 18, 2008, to November 9, 2008, daily frequency) and the Sovereign crisis (July 1, 2009, to December 31, 2014, daily frequency). In columns (1) and (4), the dependent equals one if lender bank i grants an overnight loan to borrower bank j on day t, and zero if no loan is granted. In columns (2) and (5), the dependent variable equals the (log) amount of the loan lender bank i grants to borrower bank j on day t. In columns (3) and (6), the dependent variable equals the spread between the interest rate of the loan lender bank i grants to borrower bank j on day t and the interest rate paid on excess reserves (IOER) on day t. 'Cross-border' is a dummy variable that equals one if lender bank i and borrower bank j are headquartered in different countries, and zero otherwise. 'Crisis' refers to the Euribor-OIS spread (3M) for the Lehman crisis, and to the mean (log) periphery CDS spread for sovereign debt crisis, which we scaled such that the lowest value in each subsample equals zero, and the highest value equals one. The definition of 'GIPS Bank', 'Creditor Rights', 'Public Debt', 'Large Bank', and 'High Leverage Bank' can be found in the Appendix Table A1. Fixed effects are included ('Yes') as indicated. Where possible, a constant is included but its estimated value is not shown to avoid cluttering. Robust standard errors are presented in parentheses. *** p<.01, ** p<0.05, * p<0.1.

TABLE 5: HETEROGENEITY IN GIPS CROSS-BORDER DIFFERENTIAL DURING THE CRISIS

	Dependent Variable: Amount				Dependent Variable: Spread			
	Lehman Crisis		Sovereign Crisis		Lehman Crisis		Sovereign Crisis	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crisis * Cross-border	-0.1577***	-0.1547***	-0.0967**	-0.1040**	0.0609***	0.0622***	0.0031	0.0042
	(-2.93)	(-2.85)	(-2.02)	(-2.15)	(3.08)	(3.15)	(0.44)	(0.57)
Crisis * Cross-border * GIPS Bank	-0.1283	-0.0357	-0.5053*	-0.1364	0.0649	0.1869***	0.1414**	0.1233***
	(-0.62)	(-0.28)	(-1.85)	(-0.63)	(0.61)	(3.22)	(2.20)	(3.06)
Crisis * Cross-border * GIPS Bank * Large GIPS Bank	0.1067		0.2297		0.1291		-0.0088	
	(0.43)		(0.64)		(1.04)		(-0.12)	
Crisis * Cross-border * GIPS Bank * High Leverage GIPS Bank		-0.0323		-0.6568*		-0.0889		0.0629
		(-0.13)		(-1.76)		(-0.74)		(0.67)
Borrower * Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender * Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,348	7,348	38,294	38,294	7,348	7,348	38,294	38,294
R-squared	0.915	0.915	0.861	0.861	0.585	0.585	0.947	0.947

This table shows the heterogeneity in the cross-border differential for GIPS-headquartered banks in the intensive margin of credit, across two sub-periods. We define 'Lehman Crisis' (August 18, 2008, to November 9, 2008, daily frequency), and 'Sovereign Crisis' (July 1, 2009, to December 31, 2014, daily frequency). The dependent variable in columns 1-4 is at the borrower-lender-time level and equals the (log) amount of the loan lender bank i grants to borrower bank j on day t. The dependent variable in columns 5-8 is at the borrower-lender-time level and equals the spread between the interest rate of the loan lender bank i grants to borrower bank j on day t and the interest rate paid on excess reserves (IOER) on day t. 'Cross-border' is a dummy variable that equals one if lender bank i and borrower bank j are headquartered in different countries, and zero otherwise. 'Crisis' refers to the Euribor-OIS spread (3M) for the Lehman crisis and to the mean (log) periphery CDS spread for sovereign debt crisis. We scaled our crisis variables (Euribor-OIS spread, and mean (log) periphery CDS) such that the lowest value in each subsample equals zero, and the highest value equals one. The definition of our main variables and 'GIPS Bank', 'Large GIPS Bank' and 'High Leverage GIPS Bank ' can be found in the Appendix Table A1. Fixed effects are included ('Yes') as indicated. Where possible, a constant is included but its estimated value is not shown to avoid cluttering. Robust standard errors are presented in parentheses. *** p<.01, ** p<0.05, * p<0.1.

TABLE 6: LENDER BANK LOCATION VERSUS NATIONALITY

	Lehman Crisis			Sovereign Crisis		
	Access	Amount	Spread	Access	Amount	Spread
	(1)	(2)	(3)	(4)	(5)	(6)
Crisis * Cross-border (foreign lender)	-2.1466**	-0.1678***	0.0665***	-0.7737*	-0.4389**	0.1309***
	(-2.34)	(-2.63)	(2.84)	(-1.69)	(-2.20)	(3.16)
Crisis * Domestic (foreign lender)	1.2928	-0.1680*	-0.0407	0.3015	0.7696*	-3.7881
	(0.75)	(-1.79)	(-1.25)	(0.40)	(1.83)	(-1.09)
Borrower * Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Lender * Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	188,160	7,348	7,348	4,252,416	38,294	38,294
R-squared	0.360	0.919	0.630	0.306	0.862	0.947

This table shows the differential credit conditions by foreign lenders (both different and the same location than the borrowing bank) in the extensive and intensive margin of credit during the Lehman crisis (August 18, 2008, to November 9, 2008, daily frequency) and the Sovereign crisis (July 1, 2009, to December 31, 2014, daily frequency). In columns (1) and (4), the dependent equals one if lender bank i grants an overnight loan to borrower bank j on day t, and zero if no loan is granted. In columns (2) and (5), the dependent variable equals the (log) amount of the loan lender bank i grants to borrower bank j on day t. In columns (3) and (6), the dependent variable equals the spread between the interest rate of the loan lender bank i grants to borrower bank j on day t and the interest rate paid on excess reserves (IOER) on day t. 'Cross-border (foreign lender)' is a dummy variable that equals one if lender bank i and borrower bank j are headquartered in different countries and their bank parents are of different nationality , and zero otherwise. 'Domestic (foreign lender)' is a dummy variable that equals one if lender bank i and borrower bank j are headquartered in the same countries and their bank parents are of different nationality , and zero otherwise. 'Crisis' refers to the Euribor-OIS spread (3M) for the Lehman crisis, and to the mean (log) periphery CDS spread for sovereign debt crisis, which we scaled such that the lowest value in each subsample equals zero, and the highest value equals one. In columns 5 and 6, the coefficients for 'Crisis * Cross-border (foreign lender)' and 'Crisis * Domestic (foreign lender)' are the estimated effects for GIPS banks (similar to Table 3, column 10). All regressions include for a clean comparison an additional interaction term between 'Crisis' and 'Cross-border (domestic lender)', a dummy variable that equals one if lender bank i and borrower bank j are headquartered in the same countries and their bank parents are of the same nationality , and zero otherwise. Estimated coefficients are omitted to avoid cluttering. The definition of our main variables can be found in the Appendix Table A1. Fixed effects are included ('Yes') as indicated. Where possible, a constant is included but its estimated value is not shown to avoid cluttering. Robust standard errors are presented in parentheses. *** p<.01, ** p<0.05, * p<0.1.

TABLE 7: CROSS-BORDER DIFFERENTIAL IN THE TERM SEGMENT

	Access		Amount		Spread	
	(1)	(2)	(3)	(4)	(5)	(6)
Crisis * Cross-border * Term	-18.3815**	-16.0199**	-1.5880*	-1.6823*	0.9103***	0.5030**
	(-2.29)	(-1.97)	(-1.66)	(-1.84)	(4.29)	(1.97)
Lower Order Interaction Terms	Yes	Yes	Yes	Yes	Yes	Yes
Borrower * Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Lender * Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Cross-border * Time FE	No	Yes	No	Yes	No	Yes
Cross-border * Term FE	No	Yes	No	Yes	No	Yes
Term * Time FE	No	Yes	No	Yes	No	Yes
Observations	192,882	192,868	8,841	8,807	8,841	8,807
R-squared	0.355	0.361	0.954	0.960	0.997	0.998

This table shows the cross-border differential in the extensive and intensive margin of term credit (relative to overnight credit) during the Lehman crisis (August 18, 2008, to November 9, 2008, daily frequency). In columns (1) and (2), the dependent equals one if lender bank i grants a loan (any maturity) to borrower bank j on day t, and zero if no loan is granted. In columns (3) and (4), the dependent variable equals the (log) amount of the loan lender bank i grants to borrower bank j on day t. In columns (3) and (6), the dependent variable equals the spread between the interest rate of the loan lender bank i grants to borrower bank j on day t and the interest rate paid on excess reserves (IOER) on day t. 'Cross-border' is a dummy variable that equals one if lender bank i and borrower bank j are headquartered in different countries, and zero otherwise. 'Crisis' refers to the Euribor-OIS spread (3M), which we scaled such that the lowest value equals zero, and the highest value equals one. In columns (1) and (2),'Term' is a dummy variable that equals one for any loan with a maturity longer than overnight, and zero otherwise. In columns (3) to (6), 'Term' is a binary variable that takes the value of one for any loan with a maturity longer than two weeks, and zero otherwise. The definition of our main variables can be found in the Appendix Table A1. Fixed effects are included ('Yes') or not ('No') as indicated. Where possible, a constant is included but its estimated value is not shown to avoid cluttering. Robust standard errors are presented in parentheses. *** p<.01, ** p<0.05, * p<0.1.

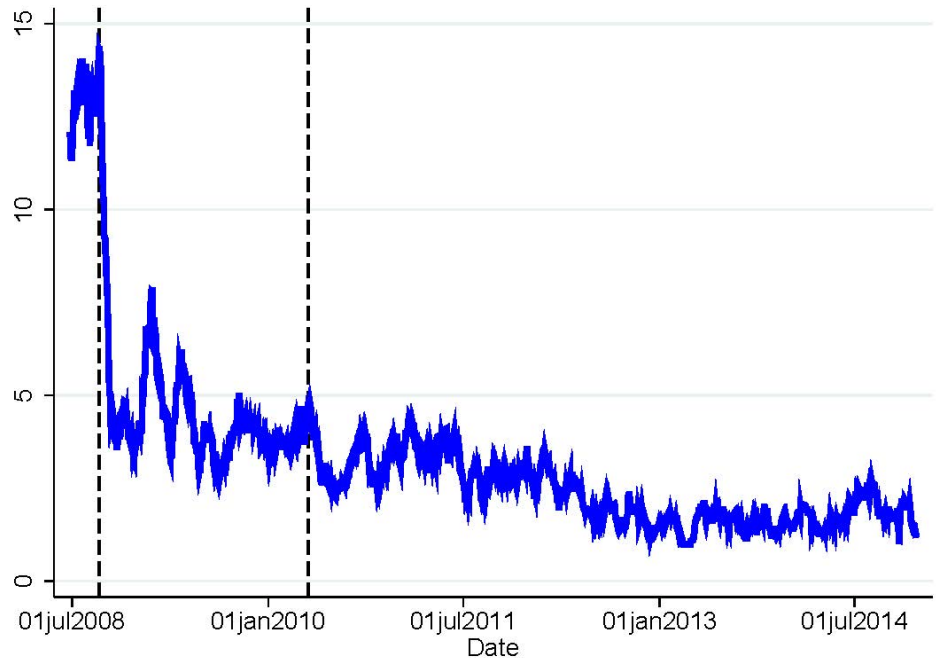
TABLE 8: MONETARY POLICY AND CROSS-BORDER LENDING

	Sample: +/– 1 Week Around Monetary Policy Event				
Monetary Policy Event:	**Full Allotment** (October 15, 2008)	**First 3-Yr LTRO** (December 21, 2011)	**Second 3-Yr LTRO** (February 29, 2012)	**Draghi's Whatever-it-takes-speech** (July 26, 2012)	**OMT Announcement** (August 2, 2012)
PANEL A - Dependent Variable: Access	(1)	(2)	(3)	(4)	(5)
Monetary Policy * Cross-border	1.5854**	–0.5002	1.9334*	2.3385**	3.3960***
	(0.79)	(0.66)	(1.05)	(1.12)	(1.31)
Borrower * Time FE	Yes	Yes	Yes	Yes	Yes
Lender * Time FE	Yes	Yes	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes	Yes	Yes
Observations	27,760	22,280	15,642	14,443	11,910
R-squared	0.551	0.550	0.509	0.619	0.631
PANEL B - Dependent Variable: Amount	(1)	(2)	(3)	(4)	(5)
Monetary Policy * Cross-border	–0.0706	–0.1498**	–0.0002	0.0260	0.0860
	(0.07)	(0.07)	(0.18)	(0.10)	(0.18)
Monetary Policy	0.0445	0.1477***	–0.0884	–0.0194	0.0139
	(0.04)	(0.06)	(0.11)	(0.06)	(0.08)
Cross-border	–0.3580***	–0.0676	0.3459	0.1705	1.1554**
	(0.12)	(0.11)	(0.28)	(0.41)	(0.45)
Borrower FE	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes
Observations	1,221	685	338	470	410
R-squared	0.855	0.884	0.885	0.890	0.876
PANEL C - Dependent Variable: Spread	(1)	(2)	(3)	(4)	(5)
Monetary Policy * Cross-border	–0.0341	0.0795***	–0.0012	0.0122	–0.0001
	(0.03)	(0.03)	(0.02)	(0.01)	(0.01)
Monetary Policy	–0.1529***	–0.1320***	–0.0325***	–0.0082	–0.0114**
	(0.02)	(0.03)	(0.01)	(0.01)	(0.01)
Cross-border	–0.0605*	–0.0725***	–0.0148	0.1776	0.2486*
	(0.03)	(0.03)	(0.01)	(0.14)	(0.15)
Borrower FE	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes
Observations	1,221	685	338	470	410
R-squared	0.760	0.764	0.720	0.884	0.929

This table shows the impact of the Eurosystem's main monetary policy measures on the cross-border differential in the extensive and intensive margin of credit. For identification, we use a window of +/– 1 week around the respective monetary policy event. In Panel A, the dependent variable is a dummy variable that equals one if lender bank i grants an overnight loan to borrower bank j on day t, and zero otherwise. The dependent variable in Panel B is the (log) amount of the loan lender bank i grants to borrower bank j on day t. The dependent variable in Panel C is the spread (in percentage points) between the interest rate of the loan lender bank i grants to borrower bank j on day t and the interest rate paid on excess reserves (IOER) on day t. For a thorough description of the dependent variables, refer to Section 3. The independent variable 'Monetary Policy' is a dummy variable that equals one the week after the date of the respective monetary policy event that is provided in the table, and zero in the week before the given event. 'Cross-border' is a dummy variable that equals one if lender bank i and borrower bank j are headquartered in different countries, and zero otherwise. The definition of our main variables can be found in the Appendix Table A1. Fixed effects are included ('Yes'). Where possible a constant is included but its estimated value is not shown to avoid cluttering. Robust standard errors are presented in parentheses. *** p<.01, ** p<0.05, * p<0.1.

APPENDIX

FIGURE A1: NUMBER OF CROSS-BORDER TERM LOANS



This figure shows the total number of cross-border trades per day (30-day moving average) over our sample from July 01, 2008 through December 31, 2014. The first dashed vertical line refers to September 15, 2008, i.e., the day on which Lehman Brothers filed for bankruptcy. The second dashed vertical line denotes April 23, 2010, the day the Greek government activated the financial support mechanism.

TABLE A1: DEFINITION OF MAIN VARIABLES

Variable	Defintion
Access(i,j,t)	Binary variable that equals the value one if lender bank i engages in at least one overnight interbank transaction with borrower bank j on day t, and zero otherwise.
Amount(i,j,t)	Logarithm of the aggregate overnight interbank lending amount (in EUR million) that lender i provides to borrower j on day t.
Spread(i,j,t)	Difference (in percentage points) between the (volume-weighted) interest rate that borrower j pays to lender i for overnight interbank transactions on day t and the interest rate paid on excess reserves (IEOR) on the same day t.
Access(j,t)	Binary variable that equals the value one if borrower j engages in at least one overnight interbank transaction on day t, and zero otherwise.
Amount(j,t)	Logarithm of the aggregate overnight interbank lending amount (in EUR million) that bank j borrows on day t.
Spread(j,t)	Difference (in percentage points) between the (volume-weighted) interest rates that borrower j pays for overnight interbank loans on day t and the interest rate paid on excess reserves on the same day t.
Euribor-OIS(t)	Difference (in percentage points) between the three-month Euribor rate and the correspondingly-dated overnight index swap (OIS) rate on any given day t. We scale the variable such that the lowest value in sample equals zero, and the highest value equals one.
Mean Periphery CDS(t)	Average of the logarithm of the five-year periphery country CDS spread (in basis points) on any given day t. We scale the variable such that the lowest value in sample equals zero, and the highest value equals one.
Cross-border(i,j)	Binary variable that equals the value one if lender i and borrower j are headquartered in different countries, and zero otherwise.
GIPS Bank(j)	Binary variable that equals the value one if the borrowing bank is headquartered in one of the GIPS countries, i.e., Greece, Ireland, Portugal, and Spain, and zero otherwise.
Creditor Rights(j)	Index from La Porta et al. (1998) and Djankov, McLiesh, and Shleifer (2007) that measures the protection of creditor rights in the borrower country.
Public Debt(j)	Borrower-country's public debt as a fraction of the country's GDP as of 2007 for the Lehman crisis period and as of 2009 for the sovereign crisis period.
Large Bank(j)	Binary varibale that equals the value one if the borrowing bank has total asset size above the cross-sectional median as at 2007 (2009) for the Lehman crisis period (sovereign crisis period), and zero otherwise.
High Leverage Bank(j)	Binary varibale that equals the value one if the borrowing bank has a leverage ratio above the cross-sectional median as at 2007 (2009) for the Lehman crisis period (sovereign crisis period), and zero otherwise.
Large GIPS Bank(j)	Binary varibale that equals the value one if the borrowing bank is a GIPS banks and has total asset size above the cross-sectional median as at 2007 (2009) for the Lehman crisis period (sovereign crisis period), and zero otherwise.
High Leverage GIPS Bank(j)	Binary varibale that equals the value one if the borrowing bank is a GIPS banks and has a leverage ratio above the cross-sectional median as at 2007 (2009) for the Lehman crisis period (sovereign crisis period), and zero otherwise.
Monetary Policy(t)	Binary variable that equals the value of one on any day after the respective monetary policy change, and zero in the week before. We consider the three main expansionary monetary policy enacted over our two crisis periods: during the Lehman crisis, (i) the fixed-rate full allotment (Full Allotment), and during the sovereign debt crisis, (ii) the two 3-year long-term refinancing operations (First 3-Yr LTRO), (iii) and Draghi's "whatever-it-takes" speech including the related outright monetary transactions (OMT announcement) program.
Full Allotment(t)	Binary variable that equals the value one as of October 15, 2008, when the Eurosystem implemented the fixed-rate full allotment policy and, zero on any other day.
First 3-Yr LTRO(t)	Binary variable that equals the value one as of October 21, 2011, when the Eurosystem implemented the first 3-year LTRO, and zero on any other day.
Second 3-Yr LTRO(t)	Binary variable that equals the value one as of February 29, 2012, when the Eurosystem implemented the second 3-year LTRO, and zero on any other day.
Draghi's Whatever-it-takes-speech(t)	Binary variable that equals the value one as of July 26, 2012, when the Draghi gave his "whatever it takes" speech, and zero on any other day.
OMT announcement(t)	Binary variable that equals the value one as of August 2, 2012, when the ECB announced the outright monetary transactions (OMT) program, and zero on any other day.

TABLE A2: SUMMARY STATISTICS DEPENDING ON CROSS-BORDER AND DOMESTIC

PANEL A: CROSS-BORDER

	Lehman Crisis						Sovereign Crisis					
Variable	**Mean**	**Median**	**Std**	**p(10)**	**p(90)**	**Obs**	**Mean**	**Median**	**Std**	**p(10)**	**p(90)**	**Obs**
Access	5.23	0.00	22.27	0.00	0.00	108,780	1.27	0.00	11.18	0.00	0.00	2,462,496
Loan Amount	198.19	100.00	235.17	24.48	500.00	3,610	268.05	150.00	370.61	45.00	600.00	14,626
Amount	4.72	4.61	1.13	3.20	6.21	3,610	5.00	5.01	1.08	3.81	6.40	14,626
Spread	0.88	1.01	0.32	0.25	1.10	3,611	0.22	0.14	0.22	0.02	0.55	14,626

PANEL B: DOMESTIC

	Lehman Crisis						Sovereign Crisis					
Variable	**Mean**	**Median**	**Std**	**p(10)**	**p(90)**	**Obs**	**Mean**	**Median**	**Std**	**p(10)**	**p(90)**	**Obs**
Access	8.37	0.00	27.70	0.00	0.00	79,380	3.41	0.00	18.16	0.00	0.00	1,789,920
Loan Amount	109.27	50.00	239.95	10.00	200.00	3,738	131.75	50.00	266.94	10.00	300.00	23,668
Amount	3.95	3.91	1.18	2.30	5.30	3,738	3.94	3.91	1.29	2.30	5.70	23,668
Spread	0.80	1.00	0.39	0.12	1.13	3,738	0.23	0.13	0.24	0.02	0.58	23,668

This table reports summary statistics of our dependent variables used in the paper conditional on cross-border and domestic trades, across two sub-periods. We define 'Lehman Crisis' (August 18, 2008, to November 9, 2008, daily frequency), and 'Sovereign Crisis' (July 1, 2009, to December 31, 2014, daily frequency). 'Access' denotes the extensive margin of credit. 'Loan Amount' reflects the loan volume (in EUR million), 'Amount' refers to the logarithm of 'Loan Amount'. 'Spread' reflects the difference (in percentage points) between the interest rate of a loan and the interest rate paid on excess reserves (IOER). For a thorough description of the dependent variables, refer to Section 3.

TABLE A3 PANEL A: HETEROGENEITY IN CROSS-BORDER DIFFERENTIAL IN ACCESS DURING THE LEHMAN CRISIS

	Dependent Variable: Access					
	(1)	(2)	(3)	(4)	(5)	(6)
Crisis * Cross-border	-2.4133***	-2.5029***	-2.6170***	-1.8860	-2.7486***	-3.9849**
	(-2.97)	(-3.03)	(-3.14)	(-1.55)	(-3.07)	(-2.23)
Crisis * Cross-border * GIPS Bank	-1.0665					-0.4988
	(-0.41)					(-0.15)
Crisis * Cross-border * Creditor Rights		1.3082				1.2343
		(1.44)				(1.30)
Crisis * Cross-border * Public Debt			-0.0607			-0.0561
			(-1.37)			(-1.05)
Crisis * Cross-border * Large Bank				-0.9388		0.6150
				(-0.60)		(0.33)
Crisis * Cross-border * High Leverage Bank					1.2742	2.3448
					(0.70)	(1.39)
Borrower * Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Lender * Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	188,160	188,160	188,160	188,160	188,160	188,160
R-squared	0.360	0.360	0.360	0.360	0.360	0.360

This table shows the heterogeneity in the cross-border differential in the extensive margin of credit during the Lehman crisis (August 18, 2008, to November 9, 2008, daily frequency). The dependent variable is at the borrower-lender-time level and equals one if lender bank i grants an overnight loan to borrower bank j on day t, and zero if no loan is granted. 'Cross-border' is a dummy variable that equals one if lender bank i and borrower bank j are headquartered in different countries, and zero otherwise. 'Crisis' refers to the Euribor-OIS spread (3M) for the Lehman crisis, which we scaled such that the lowest value in each subsample equals zero, and the highest value equals one. The definition of 'GIPS Bank', 'Creditor Rights', 'Public Debt', 'Large Bank', and 'High Leverage Bank' can be found in the Appendix Table A1. Fixed effects are included ('Yes') as indicated. Where possible, a constant is included but its estimated value is not shown to avoid cluttering. Robust standard errors are presented in parentheses. *** p<.01, ** p<0.05, * p<0.1.

TABLE A3 PANEL B: HETEROGENEITY IN CROSS-BORDER DIFFERENTIAL IN ACCESS DURING THE SOVEREIGN CRISIS

	Dependent Variable: Access					
	(1)	(2)	(3)	(4)	(5)	(6)
Crisis * Cross-border	-0.7586**	-0.7927**	-0.7778**	-0.5220	-0.7468*	0.1262
	(-2.04)	(-2.01)	(-2.03)	(-0.86)	(-1.78)	(0.15)
Crisis * Cross-border * GIPS Bank	-0.5100					-1.0730
	(-0.38)					(-0.80)
Crisis * Cross-border * Creditor Rights		0.0219				-0.0806
		(0.06)				(-0.21)
Crisis * Cross-border * Public Debt			0.0088			-0.0023
			(0.45)			(-0.12)
Crisis * Cross-border * Large Bank				-0.4424		-0.5147
				(-0.63)		(-0.58)
Crisis * Cross-border * High Leverage Bank					-0.2264	-1.1415
					(-0.24)	(-1.54)
Borrower * Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Lender * Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,252,416	4,252,416	4,252,416	4,252,416	4,252,416	4,252,416
R-squared	0.306	0.306	0.306	0.306	0.306	0.306

This table shows the heterogeneity in the cross-border differential in the extensive margin of credit during the Sovereign crisis (July 1, 2009, to December 31, 2014, daily frequency). The dependent variable is at the borrower-lender-time level and equals one if lender bank i grants an overnight loan to borrower bank j on day t, and zero if no loan is granted. 'Cross-border' is a dummy variable that equals one if lender bank i and borrower bank j are headquartered in different countries, and zero otherwise. 'Crisis' refers to the mean (log) periphery CDS spread for sovereign debt crisis, which we scaled such that the lowest value in each subsample equals zero, and the highest value equals one. The definition of 'GIPS Bank', 'Creditor Rights', 'Public Debt', 'Large Bank', and 'High Leverage Bank' can be found in the Appendix Table A1. Fixed effects are included ('Yes') as indicated. Where possible, a constant is included but its estimated value is not shown to avoid cluttering. Robust standard errors are presented in parentheses. *** p<.01, ** p<0.05, * p<0.1.

TABLE A4 PANEL A: HETEROGENEITY IN CROSS-BORDER DIFFERENTIAL IN AMOUNT DURING THE LEHMAN CRISIS

	Dependent Variable: Amount					
	(1)	(2)	(3)	(4)	(5)	(6)
Crisis * Cross-border	-0.1531***	-0.1542***	-0.1530***	-0.1513**	-0.0833	0.0059
	(-2.89)	(-2.93)	(-2.89)	(-2.35)	(-1.37)	(0.06)
Crisis * Cross-border * GIPS Bank	-0.0422					-0.1324
	(-0.39)					(-0.95)
Crisis * Cross-border * Creditor Rights		0.0063				0.0073
		(0.15)				(0.16)
Crisis * Cross-border * Public Debt			0.0007			-0.0004
			(0.38)			(-0.25)
Crisis * Cross-border * Large Bank				-0.0082		-0.0824
				(-0.10)		(-0.83)
Crisis * Cross-border * High Leverage Bank					-0.2225**	-0.1860*
					(-2.34)	(-1.89)
Borrower * Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Lender * Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,348	7,348	7,348	7,348	7,348	7,348
R-squared	0.915	0.915	0.915	0.915	0.916	0.916

This table shows the heterogeneity in the cross-border differential in the intensive margin of credit during the Lehman crisis (August 18, 2008, to November 9, 2008, daily frequency). The dependent variable is at the borrower-lender-time level and equals the (log) amount of the loan lender bank i grants to borrower bank j on day t. 'Cross-border' is a dummy variable that equals one if lender bank i and borrower bank j are headquartered in different countries, and zero otherwise. 'Crisis' refers to the Euribor-OIS spread (3M) for the Lehman crisis, which we scaled such that the lowest value in each subsample equals zero, and the highest value equals one. The definition of 'GIPS Bank', 'Creditor Rights', 'Public Debt', 'Large Bank', and 'High Leverage Bank' can be found in the Appendix Table A1. Fixed effects are included ('Yes') as indicated. Where possible, a constant is included but its estimated value is not shown to avoid cluttering. Robust standard errors are presented in parentheses. *** p<.01, ** p<0.05, * p<0.1.

TABLE A4 PANEL B: HETEROGENEITY IN CROSS-BORDER DIFFERENTIAL IN AMOUNT DURING THE SOVEREIGN CRISIS

	Dependent Variable: Amount					
	(1)	(2)	(3)	(4)	(5)	(6)
Crisis * Cross-border	-0.0944**	-0.0939**	-0.0962**	-0.1120**	-0.1017*	-0.3178***
	(-1.97)	(-1.98)	(-2.03)	(-2.02)	(-1.74)	(-3.45)
Crisis * Cross-border * GIPS Bank	-0.3826**					-0.5155**
	(-2.03)					(-2.35)
Crisis * Cross-border * Creditor Rights		0.0119				-0.0266
		(0.33)				(-0.69)
Crisis * Cross-border * Public Debt			-0.0064**			-0.0057*
			(-2.29)			(-1.82)
Crisis * Cross-border * Large Bank				-0.0038		0.1891*
				(-0.04)		(1.82)
Crisis * Cross-border * High Leverage Bank					0.0953	0.1277
					(1.05)	(1.34)
Borrower * Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Lender * Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	38,294	38,294	38,294	38,294	38,294	38,294
R-squared	0.861	0.861	0.861	0.861	0.861	0.862

This table shows the heterogeneity in the cross-border differential in the intensive margin of credit during the Sovereign crisis (July 1, 2009, to December 31, 2014, daily frequency). The dependent variable is at the borrower-lender-time level and equals the (log) amount of the loan lender bank i grants to borrower bank j on day t. 'Cross-border' is a dummy variable that equals one if lender bank i and borrower bank j are headquartered in different countries, and zero otherwise. 'Crisis' refers to the mean (log) periphery CDS spread for sovereign debt crisis, which we scaled such that the lowest value in each subsample equals zero, and the highest value equals one. The definition of 'GIPS Bank', 'Creditor Rights', 'Public Debt', 'Large Bank', and 'High Leverage Bank' can be found in the Appendix Table A1. Fixed effects are included ('Yes') as indicated. Where possible, a constant is included but its estimated value is not shown to avoid cluttering. Robust standard errors are presented in parentheses. *** p<.01, ** p<0.05, * p<0.1.

TABLE A5 PANEL A: HETEROGENEITY IN CROSS-BORDER DIFFERENTIAL IN SPREAD DURING THE LEHMAN CRISIS

	Dependent Variable: Spread					
	(1)	(2)	(3)	(4)	(5)	(6)
Crisis * Cross-border	0.0665***	0.0707***	0.0752***	0.0402*	0.0999***	-0.0088
	(3.42)	(3.64)	(3.81)	(1.72)	(4.22)	(-0.29)
Crisis * Cross-border * GIPS Bank	0.1692***					0.1651***
	(3.46)					(2.93)
Crisis * Cross-border * Creditor Rights		-0.0304**				-0.0117
		(-2.27)				(-0.90)
Crisis * Cross-border * Public Debt			0.0006			0.0013
			(0.74)			(1.62)
Crisis * Cross-border * Large Bank				0.0769**		0.0935***
				(2.35)		(2.65)
Crisis * Cross-border * High Leverage Bank					-0.0815**	0.0178
					(-2.24)	(0.46)
Borrower * Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Lender * Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,348	7,348	7,348	7,348	7,348	7,348
R-squared	0.585	0.584	0.583	0.584	0.584	0.586

This table shows the heterogeneity in the cross-border differential in the intensive margin of credit during the Lehman crisis (August 18, 2008, to November 9, 2008, daily frequency). The dependent variable is at the borrower-lender-time level and equals the spread between the interest rate of the loan lender bank i grants to borrower bank j on day t and the interest rate paid on excess reserves (IOER) on day t. 'Cross-border' is a dummy variable that equals one if lender bank i and borrower bank j are headquartered in different countries, and zero otherwise. 'Crisis' refers to the Euribor-OIS spread (3M) for the Lehman crisis, which we scaled such that the lowest value in each subsample equals zero, and the highest value equals one. The definition of 'GIPS Bank', 'Creditor Rights', 'Public Debt', 'Large Bank', and 'High Leverage Bank' can be found in the Appendix Table A1. Fixed effects are included ('Yes') as indicated. Where possible, a constant is included but its estimated value is not shown to avoid cluttering. Robust standard errors are presented in parentheses. *** p<.01, ** p<0.05, * p<0.1.

TABLE A5 PANEL B: HETEROGENEITY IN CROSS-BORDER DIFFERENTIAL IN SPREAD DURING THE SOVEREIGN CRISIS

	Dependent Variable: Spread					
	(1)	(2)	(3)	(4)	(5)	(7)
Crisis * Cross-border	0.0030	0.0081	0.0027	-0.0095	0.0102	-0.0013
	(0.43)	(1.06)	(0.33)	(-1.00)	(1.12)	(-0.09)
Crisis * Cross-border * GIPS Bank	0.1361***					0.0908*
	(3.28)					(1.66)
Crisis * Cross-border * Creditor Rights		-0.0090				-0.0004
		(-1.11)				(-0.05)
Crisis * Cross-border * Public Debt			-0.0012			-0.0009
			(-1.35)			(-0.68)
Crisis * Cross-border * Large Bank				0.0388**		0.0342**
				(2.40)		(2.47)
Crisis * Cross-border * High Leverage Bank					0.0158	-0.0339
					(1.14)	(-1.38)
Borrower * Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Lender * Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	38,294	38,294	38,294	38,294	38,294	38,294
R-squared	0.947	0.947	0.947	0.947	0.947	0.947

This table shows the heterogeneity in the cross-border differential in the intensive margin of credit during the Sovereign crisis (July 1, 2009, to December 31, 2014, daily frequency). The dependent variable is at the borrower-lender-time level and equals the spread between the interest rate of the loan lender bank i grants to borrower bank j on day t and the interest rate paid on excess reserves (IOER) on day t. 'Cross-border' is a dummy variable that equals one if lender bank i and borrower bank j are headquartered in different countries, and zero otherwise. 'Crisis' refers to the mean (log) periphery CDS spread for sovereign debt crisis, which we scaled such that the lowest value in each subsample equals zero, and the highest value equals one. The definition of 'GIPS Bank', 'Creditor Rights', 'Public Debt', 'Large Bank', and 'High Leverage Bank' can be found in the Appendix Table A1. Fixed effects are included ('Yes') as indicated. Where possible, a constant is included but its estimated value is not shown to avoid cluttering. Robust standard errors are presented in parentheses. *** p<.01, ** p<0.05, * p<0.1.

TABLE A6: MONETARY POLICY AND HETEROGENEITY IN CROSS-BORDER LENDING

	Sample: +/– 1 Week Around Monetary Policy Event				
	Dependent Variable: Access				
Monetary Policy Event:	**Full Allotment**	**First 3-Yr LTRO**	**Second 3-Yr LTRO**	**Draghi's Whatever-it-takes-speech**	**OMT Announcement**
	(October 15, 2008)	(December 21, 2011)	(February 29, 2012)	(July 26, 2012)	(August 2, 2012)
PANEL A - Dependent Variable: Access	(1)	(2)	(3)	(4)	(5)
Monetary Policy * Cross-border	5.2661***	-1.0730	3.6801*	0.0577	4.0547
	(2.93)	(-0.70)	(1.85)	(0.01)	(0.83)
Monetary Policy * Cross-border * GIPS Bank	0.8742	-5.2566**	7.2238*	1.0270	-1.2159
	(0.27)	(-2.30)	(1.70)	(0.12)	(-0.12)
Monetary Policy * Cross-border * Creditor Rights	-0.9751	0.3853	0.4858	0.1106	0.2492
	(-1.06)	(0.50)	(0.53)	(0.01)	(0.03)
Monetary Policy * Cross-border * Public Debt	0.0069	0.0295	0.0630	0.0445	-0.0606
	(0.14)	(0.88)	(1.01)	(0.31)	(-0.34)
Monetary Policy * Cross-border * Large Bank	-3.6679**	0.1684	-2.5063	2.4461*	-0.3545
	(-2.12)	(0.12)	(-1.48)	(1.75)	(-0.18)
Monetary Policy * Cross-border * High Leveraged Bank	-1.8049	1.0652	-0.0255	0.8226	-0.8898
	(-1.03)	(0.77)	(-0.01)	(0.41)	(-0.35)
Borrower * Time FE	Yes	Yes	Yes	Yes	Yes
Lender * Time FE	Yes	Yes	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes	Yes	Yes
Observations	27,760	22,280	15,642	14,443	11,910
R-squared	0.552	0.551	0.51	0.619	0.631

This table shows the impact of the Eurosystem's main monetary policy measures on the cross-border differential in the extensive depending on borrowing bank heterogeneity. For identification, we use a window of +/– 1 week around the respective monetary policy event. The dependent variable is a dummy variable that equals one if lender bank i grants an overnight loan to borrower bank j on day t, and zero otherwise. The independent variable 'Monetary Policy' is a dummy variable that equals one the week after the date of the respective monetary policy event that is provided in the table, and zero in the week before the given event. 'Cross-border' is a dummy variable that equals one if lender bank i and borrower bank j are headquartered in different countries, and zero otherwise. The definition of our main variables and 'GIPS', 'Creditor Rights', 'Public Debt', 'Large Bank', and 'High Leverage Bank' can be found in the Appendix Table A1. Fixed effects are included ('Yes'). Where possible a constant is included but its estimated value is not shown to avoid cluttering. Robust standard errors are presented in parentheses. *** p<.01, ** p<0.05, * p<0.1.