DISCUSSION PAPER SERIES

No. 10927

COUNTERCYCLICAL FOREIGN CURRENCY BORROWING: EUROZONE FIRMS IN 2007-2009

Philippe Bacchetta and Ouarda Merrouche

FINANCIAL ECONOMICS

ISSN 0265-8003

COUNTERCYCLICAL FOREIGN CURRENCY BORROWING: EUROZONE FIRMS IN 2007-2009

Philippe Bacchetta and Ouarda Merrouche

Discussion Paper No. 10927
November 2015
Submitted 28 October 2015

Centre for Economic Policy Research
33 Great Sutton Street, London EC1V 0DX, UK
Tel: (44 20) 7183 8801
www.cepr.org

This Discussion Paper is issued under the auspices of the Centre's research programme in **FINANCIAL ECONOMICS**. Any opinions expressed here are those of the author(s) and not those of the Centre for Economic Policy Research. Research disseminated by CEPR may include views on policy, but the Centre itself takes no institutional policy positions.

The Centre for Economic Policy Research was established in 1983 as an educational charity, to promote independent analysis and public discussion of open economies and the relations among them. It is pluralist and non-partisan, bringing economic research to bear on the analysis of medium- and long-run policy questions.

These Discussion Papers often represent preliminary or incomplete work, circulated to encourage discussion and comment. Citation and use of such a paper should take account of its provisional character.

Copyright: Philippe Bacchetta and Ouarda Merrouche

COUNTERCYCLICAL FOREIGN CURRENCY BORROWING: EUROZONE FIRMS IN 2007-2009[†]

Abstract

Despite international financial disintegration, we document a dramatic increase in dollar borrowing among leveraged Eurozone corporates during the Great Financial Crisis. Using loan-level data, we trace this increase to the twin crisis in the credit market and in funding markets. The reduction in the supply of credit by Eurozone banks caused riskier borrowers to shift to foreign banks, in particular US banks. The coincident rise in the relative cost of euro wholesale funding and the disruptions in the FX swap market caused a rise in dollar borrowing from US banks, especially for firms in export-oriented sectors. Although global bank lending is often reported to amplify the international credit cycle, we show that foreign banking acted as a shock absorber that weathered the real consequences of the credit crunch in Europe.

JEL Classification: E44, G21 and G30
Keywords: corporate debt, credit crunch, foreign banks and money market

Philippe Bacchetta philippe.bacchetta@unil.ch
University of Lausanne, Swiss Finance Institute and CEPR

Ouarda Merrouche ouarda.merrouche@eui.eu
University of Lausanne and CEPR

[†] We would like to thank Linda Goldberg, Steven Ongena, and Clemens Otto, as well as seminar participants at the New York Fed, the IMF, the World Bank, the University of Lausanne, University of Geneva, University Paris Dauphine, Aix-Marseille School of Economics, and participants at the 1st RELTIF conference held at Oxford University for helpful comments and suggestions. Financial support from the ERC Advanced Grant #269573 is gratefully acknowledged.

1. Introduction

Global banking flows have been a major victim of the financial crisis. While gross capital flows declined sharply in general (e.g., Broner et al., 2013), the decline has been particularly steep for banking flows among developed economies (Milesi-Ferretti and Tille, 2011). The literature shows evidence of a flight home effect in syndicated bank loans (Giannetti and Laeven, 2012a) and of financial protectionism in bank lending (Rose and Wieladek, 2014). We also observe that global banks have increased the use of their local currency in their lending (e.g., Ivashina et al., 2012). More generally, the evidence indicates that global banking flows amplify international credit cycles (e.g., Giannetti and Laeven, 2012b, Calderon and Kubota, 2012) so that foreign borrowing, typically in foreign currency, declines sharply in a credit crunch.

In this context of substantial financial disintegration, it is surprising that foreign currency borrowing by many Eurozone non-financial corporates increased dramatically during the recent financial crisis from an average of 5 billion USD during 2004-2006 to a peak of 40 billion in 2008 (solid line in Figure 1). While the proportion of dollar borrowing was about 5% in 2004-2006, it increased to 35% for non-investment grade borrowers and to 15% for investment grade borrowers in the second half of 2008 (Figure 2).[3] Importantly, we do not observe a similar pattern in bonds. The increase in foreign currency bond issuance was rather transitory (it lasted on average 1 quarter) and much smaller (4 percentage points for investment grade firms and 8 percentage points for non-investment grade firms).

The purpose of this paper is to document this surprising aspect of international banking flows and identify the factors that led to that development. Moreover, we provide evidence that foreign

[3] This increase cannot be attributed to a valuation effect: the euro appreciated against the dollar by about 20% during the period when the increase was strongest, i.e., Q2-2007 and Q3-2008.

banking could mitigate the transmission of the credit crunch to employment. We argue that the increase in foreign currency borrowing by Eurozone leveraged[4] firms is a consequence of two main (and perhaps related) symptoms of the global financial crisis: the domestic credit crunch and the drying up of global interbank markets. Figure 1 depicts a high positive correlation between the amount of dollar debt issued by Eurozone corporates and an indicator of the tightness of the domestic credit supply. This indicator is the net percentage of domestic banks surveyed by the European Central Bank (ECB) that report tightening in credit standards to large firms in the past 3 months.

We develop a simple model to illustrate how a contraction of the domestic credit supply can lead to more dollar borrowing by more export-oriented firms. The model predicts that higher dollar borrowing during a domestic credit crunch results from the combined effect of an increase in the market share of foreign banks and an increase in the relative cost of funding in euro faced by foreign banks. In sum, the domestic credit crunch pushes firms to borrow from foreign banks and the disruption in the euro interbank market pushes foreign banks away from lending in euros. We also show that an increase in the cost of swapping euro into dollar leads firms to increase their demand for foreign dollar credit. An important feature for dollar borrowing to increase during a domestic credit crunch is therefore that foreign credit be countercyclical.

Hence we decompose our empirical analysis into three steps. In a first step we verify that foreign credit is countercyclical: when Eurozone banks tighten lending standards, riskier borrowers are more likely to obtain a loan from a foreign bank rather than from a domestic bank. We find that this effect at the intensive margin is attributable to US banks. The willingness of US banks to

[4] Throughout the paper we use the terms leveraged, non-investment grade, low-credit quality, and risky interchangeably. Non-investment grade firms in our sample have a leverage ratio (or a ratio of long-term debt over total debt) of 19.5% against 5.7% for investment grade firms.

replace Eurozone banks can be explained by the fact that during this period and until 2012 US lenders operated fully under Basel I[5]. Under the Basel I framework, the risk weight on risky and safe corporate debt is the same. This means that US banks have greater incentive than Eurozone banks to load onto risky corporate debt.[6] Another reason why US banks may be willing to assume more risk is that they were less capital constrained than domestic lenders. On the eve of the crisis, Eurozone banks looked much more vulnerable than US or other extra-Eurozone banks. Eurozone banks were less capitalized and relied less on stable forms of funding.[7] According to Merrouche and Mariathasan (2012), Eurozone banks required much more public capital injections compared with other banks. Relatedly, Laeven and Valencia (2013) find that a much bigger fraction of the banking system failed or was intervened in the Eurozone than in the US, reaching 80% of total banking sector assets in some countries like Greece, Belgium, or France. The shift of US banks towards riskier loans is significant even when we account for changes in the stance of US monetary policy.

In a second step, we analyze the differences in the choice of currency between risky and safe borrowers during the credit crunch in relation to variations in the cost of funding in the euro interbank market (the euribor-OIS spread) and the cost of swapping euro into dollar --the deviation from covered interest parity (the euro basis). The switch to dollar borrowing sourced from foreign banks is significant for firms in export-intensive sectors and confirms the model's predictions.

[5] While the US officially adopted Basel II in 2007, the date of expected compliance was delayed to 2012. See Daryl Getter, *US implementation of the Basel Capital Regulatory Framework*, Congressional Research Report 7-5700, April 9 2014. On June 7, 2012, the Federal Banking Regulators announced the final rule for implementation of Basel II. First approvals for the use of Basel II capital rules were issued in February 2014.

[6] Relatedly, Duchin and Sosyura (2014) show that after receiving government support, US banks rebalance toward riskier assets and that this shift in risk occurs mostly within the same asset class and therefore remains undetected by regulatory capital ratios.

[7] According to Bankscope data in 2007 Eurozone banks had a Tier1 leverage ratio of 5% and a ratio of retail deposits to total assets of 44% against 9% and 72% respectively for US banks.

Thirdly, we assess the real effect of foreign credit. We find that foreign banking alleviates the financial constraints of Eurozone firms: during the credit contraction of 2007-2009, firms exposed to weak banks do not pay a higher spread on new loans issued and do not cut employment when they have a prior relationship with a foreign bank. We measure exposure to a weak bank by a dummy indicating pre-crisis co-syndication with a bank that received public capital support, was forced into merger, or filed for bankruptcy between 2007 and 2010.[8]

We specify a linear model with firm fixed effects for the choice among different sources of finance and among different currencies. The fact that we focus on within-firm shifts between different sources of finance and different currencies means that our results cannot be driven by changes in the composition of firms tapping different forms of finance over time or by changes in the aggregate demand for debt. Further, the fact that we focus on Eurozone countries means that our results cannot be driven by differences in the stance of monetary policy or nominal exchange rate expectations across countries. Our baseline sample includes quarterly syndicated loan issuances obtained from Thomson-Reuters Dealscan for the period Q1-2004 to Q4-2009. We observe the nationality of lead lenders and the currency denomination of loans. In our setting we define foreign banks as banks headquartered outside the Eurozone. Moreover, we define a foreign bank loan as a syndicated loan with at least one lead foreign bank; alternatively we measure the participation of foreign lead banks by the percentage of foreign banks in a syndicate.

Literature Review

There is a growing literature analyzing cross-border banking during the recent financial crisis (e.g., Cetorelli and Goldberg, 2011). We document and explain a new stylized fact from this

[8] The data are from Merrouche and Mariathasan (2012).

period which is the dramatic increase in offshore dollar credit. Our findings on the role of foreign banks extend earlier work by Haselmann and Watchel (2011) and Bruno and Hauswald (2012). Haselmann and Watchel (2011) document that foreign banks (banks headquartered outside the borrower home country) play a prominent role in the syndicated loan market and that they lend more to riskier borrowers in developed markets. They however do not study the role of foreign banks during a crisis. Using country-level data, Bruno and Hauswald (2012) find a positive effect of foreign banks' presence on real growth and this effect is stronger during banking crises and in contexts where informational and legal frictions loom larger, hindering firms' access to credit. Our firm-level data allow for a better identification of the channel through which the presence of foreign banks alters firm performance during a crisis.

Our paper extends three strands of literature: (1) on the reshaping of corporate financing during a credit crunch; (2) on the drivers of foreign currency credit; and (3) on the real effects of the 2007-2009 credit crunch. The first strand of literature includes Ivashina and Becker (2014) who find that Eurozone corporates increased their reliance on the bond market in response to the contraction of bank credit. Holmstrom and Tirole (1997) study the effect of a credit contraction on the forms of financing in a model where firms are heterogeneous in their net worth. In line with our findings their model implies a differentiated response to shocks depending on credit quality. De Fiore and Uhlig (2013) develop a general equilibrium model with firms that differ in their risk of default that can replicate the aggregate shift from bank finance to bond finance witnessed in Europe since 2009. But these models do not allow for foreign bank lending as an alternative source of financing.

The literature on foreign currency borrowing or lending focuses on emerging markets in the context of financial crises.[9] The empirical evidence shows that firms are more likely to borrow in foreign currency when they are exporters or with large cross-currency interest differentials (e.g., Keloharju and Niskanen, 2001, McCauley et al., 2015, Brown, Kirschenman and Ongena, 2013, Brown, Ongena, and Yeşin, 2011). However, there is little work on advanced economies. For the recent financial crisis, an exception is Ivashina et al. (2012) who find that Eurozone banks reduced their dollar lending.

The growing literature on the real consequences of the 2007-2009 credit crunch includes Chodorow-Reich (2013); Bentolila et al. (2013), and Haltenhof et al. (2014) who study the impact on employment; and Cingano et al. (2013) who also analyze the effect on investment.[10] Like our paper, all these papers find a significant effect on employment exploiting micro (firm or industry) level data. But none of these papers studies the mitigating role of foreign banks which is the focus of this paper.

The remainder of the paper is organized as follows. In Section 2 we develop the theoretical hypotheses. Section 3 presents our data sources and gives a historical background of the twin crises in the credit market and in funding markets. Section 4 describes our two-step empirical approach and discusses the results. Section 5 reports an analysis of the real effect of the credit crisis and of the mitigating role of foreign banks. Section 6 concludes.

[9] For theoretical papers, see Aghion et al. (2004), Burnside et al. (2004), Jeanne (2005), or Schneider and Tornell (2004).
[10] Some of the recent literature focuses on the later period of the sovereign debt crisis, e.g., Acharya et al. (2014) or Popov and van Horen (2015).

2. Theoretical Framework

The objective of this section is to provide a framework to structure the empirical analysis. For this purpose we develop a simple model that explains the borrowing choice between Home and Foreign banks and between Home and Foreign currency. In this model, more risky firms switch from Home to Foreign banks after a Home credit crunch; and more export-oriented firms switch from Home to Foreign currency borrowing with disruptions in the Home money market and the FX swap market.

2.1. Basic Setup

Consider a simple framework where Home firms can borrow from Home and Foreign banks. Firms differ in their exposure to exchange rate risk and in their overall riskiness for lenders. There is a proportion of N_t Home bank loans and $N_t^* = 1 - N_t$ Foreign bank loans. A Home credit crunch implies a decline in N_t and an increase in N_t^*. Moreover, in the spirit of Holmstrom and Tirole (1997) a credit crunch affects the most risky firms.[11] Therefore, with a Home credit crunch the most risky firms switch from Home to Foreign banks.[12]

Bank loans can be either in euros, the Home currency, or in dollars, the Foreign currency. The spot exchange rate in euro per dollar at time t is S_t. Firms decide the currency of their loan based on risk and on the expected borrowing cost. The interest rate charged by banks to firms in euro is i_t^E and the one in dollars is i_t^D. Changes in i_t^E and i_t^D are directly affected by money market rates, where banks get their marginal funding. We assume that Home (Foreign) banks have an

[11] For simplicity, we assume that credit risk is not correlated to exchange rate risk (in contrast to the existing literature on foreign currency debt).
[12] In Holmstrom and Tirole (1997), a credit crunch removes all financing for the more risky firms. But if the credit crunch is for Home banks only, the more risky firms can turn to Foreign banks.

advantage in borrowing in euros (dollars).[13] In equilibrium, we assume that Home banks only lend in euros, while Foreign banks lend both in euros and dollars. The proportion of loans in dollars is denoted by D_t. Foreign banks thus lend D_t in dollars and $1 - N_t - D_t$ in euros.

Firms can also borrow in dollars and hedge through the forward or swap market, using the forward rate F_t. When Covered Interest rate Parity (CIP) does not hold, hedged dollar borrowing will differ from euro borrowing. We define the deviation from CIP expressed in dollar, or the *euro basis*, as $\Delta_t = (S_t/F_t)(1 + i_t^E) - (1 + i_t^D)$. The proportion of dollar borrowing, D_t, is determined by i_t^E, i_t^D and Δ_t, as illustrated in the next subsection.

2.2. Currency Denomination

Let us abstract from time subscripts and assume that the current exchange rate is equal to one. We denote by S the next period exchange rate. We also assume that price levels are equal to one in each currency and that y is the total output level identical to all firms. There is a continuum of firms indexed by i. A proportion λ_i of output is sold in domestic euros and 1-λ_i in dollars. Firms with low λ_i will thus be considered as export-oriented firms. We assume that λ_i is uniformly distributed so that $\lambda_i \in [0,1]$. The income of firm i is

$$y_i = (\lambda_i + (1 - \lambda_i)S)y$$

where S is the only random variable and is assumed to be normally distributed $N(1, \sigma^2)$. We also assume that $y = 1$.

Home firms need to borrow for production. Due to transactions costs, firms have only one loan contract in either currency. Therefore, firms choose the currency that gives them the higher

[13] For example, Home firms have larger home currency deposits and easier access to Home central bank liquidity.

expected utility. We assume that firms derive utility from their profits, $U(\Pi_i)$ and that the utility function is exponential, so that they have mean-variance preferences. We denote by Π_i^E, Π_i^D, and Π_i^{DH} the profits with borrowing in euros, in unhedged dollars and in hedged dollars. These are:

$$\Pi_i^E = y_i - (1 + i^E)$$

$$\Pi_i^D = y_i - S(1 + i^D)$$

$$\Pi_i^{DH} = y_i - S(1 + i^D) - (F - S)(1 + i^D) = y_i - F(1 + i^D)$$

where the last term in Π_i^{DH} is the forward contract (assuming full hedging). When CIP holds and abstracting from transactions costs, $\Pi_i^E = \Pi_i^{DH}$ (as $F(1 + i^D) = 1 + i^E$).

Firms prefer borrowing in dollars if this gives a higher expected utility than borrowing in euros, i.e., $EU(\Pi_i^D) > EU(\Pi_i^E)$. With mean-variance preferences, firm *i* prefers borrowing in dollars if:

$$E(\Pi_i^D) - \frac{\gamma}{2} Var(\Pi_i^D) > E(\Pi_i^E) - \frac{\gamma}{2} Var(\Pi_i^E)$$

which is equivalent to:

$$i^E - i^D + \frac{\gamma}{2}[2(1 - \lambda_i) - (1 + i^D)](1 + i^D)\sigma^2 > 0$$

This implies that the more export-oriented firms with $\lambda_i < \lambda^*$ prefer borrowing in dollars, where the threshold λ^* is given by:

$$\lambda^* = \frac{1 - i^D}{2} + \frac{i^E - i^D}{(1 + i^D)\gamma\sigma^2}$$

Since λ_i is distributed uniformly over [0,1], λ^* also represents the aggregate demand for dollar borrowing. The first term in λ^* is the level below which borrowing in dollars reduces risk: only

highly export-oriented firms find it optimal to borrow in dollars. The second term is simply determined by the differential cost of borrowing. If $i^E > i^D$, more firms prefer borrowing in dollars. When $\gamma\sigma^2$ are higher, firms find it more useful to borrow in dollars despite the higher cost. If i^E increases, the more export oriented firms that borrow in euros (λ_i higher but close to λ^*) will switch to borrow in dollars.

Moreover if CIP does not hold so that $\Delta > 0$, firms will start switching from euro to dollar borrowing. The extent of this switch will depend on transaction costs, that we do not model here, but not on export orientation. Overall, we can denote the proportion of loans in dollars as $D = D(i^E, i^D, \Delta)$, where D increases with i^E and Δ and decreases with i^D.

2.3. Explaining the Increase in Dollar Borrowing

A significant increase in foreign currency borrowing D can be explained by a combination of two shocks. First, a Home credit crunch triggered by a negative shock to domestic banks' capital increases the market share N_t^* of Foreign banks, so that the more risky firms switch from Home to Foreign banks. When Foreign banks have low deposits in domestic currency, the shift to Foreign banks is likely to be associated with a shift to Foreign currency. Moreover, if Foreign banks have access to the wholesale market to raise domestic currency funding, a shift to dollar also occurs with a drying up of liquidity in wholesale markets that coincides with a Home credit crunch. The drying up of liquidity in euro interbank markets and dollar swap market makes dollar borrowing more attractive, especially for those firms that have a high share of foreign income.

In our empirical analysis we test the predictions of the model focusing on the period when Eurozone banks tightened lending standards hence disproportionately reducing credit to riskier borrowers. In Subsection 4.1, we first verify that during this period riskier borrowers increased

their reliance on foreign banks. More precisely, we examine whether the decision to switch to a foreign bank loan is related to the interaction between a Eurozone credit tightening index and firm riskiness.

In Subsection 4.2, we test whether money market disruptions coincident with a Home credit crunch, affecting i_t^E and i_t^D, influence dollar borrowing for risky firms. We also test whether an increase in deviations from CIP, measured by Δ_t, increases the demand for dollar credit by Eurozone firms. In both cases, we examine whether the degree of export orientation (as a proxy for foreign currency earnings) influences the impact of these variables. In the regressions, this means that we will interact money market risk premiums and Δ_t with the degree of riskiness of firms and with their export orientation.

3. Background Facts and Data

This section documents our data sources and provides a descriptive analysis of the changing lending behavior of domestic and foreign banks during the credit crunch. We then provide a historical overview of the difficulties that Eurozone banks encountered as a consequence of large exposures to the US subprime meltdown and the associated freeze in the asset backed commercial paper (ABCP) market contaminating interbank and swap markets. The model shows that the coincident drying up of liquidity in euro wholesale funding markets or in swap markets creates the conditions for an increase in dollar borrowing relative to euro borrowing during a Home credit crunch.

3.1. The Role of Foreign Banks and the Importance of Dollar Credit in the Eurozone Syndicated Loan Market

Our benchmark sample covers the quarterly syndicated loan issuance activity of Eurozone non-financial corporates. To explain the sharp increase in dollar borrowing during the 2007-2009 financial crisis we use data for the period 2004-2009. We exclude the period 2010-2013 from our baseline *control* period for two reasons. First, heightened sovereign risk is likely to have impacted the currency composition of credit but through different mechanisms and in different ways (Ivashina, Scharfstein, and Stein, 2012). Precisely, because heightened sovereign risk was associated with similar, albeit weaker, disruptions in funding markets as in 2007-09, but possibly impacting both the supply of domestic and foreign credit[14], including the period 2010-2013 in our sample would contaminate our analysis as we try to explain what happened in 2007-2009. Second, in 2012 the US banks started transitioning towards the Basel II regulatory framework.

The data source for syndicated loans is Thomson-Reuters Dealscan. As is common in the literature, we consider loans to be issued by the lead banks. Syndicated loans are often subscribed by more than one lead bank, but we do not observe the contribution of each lead bank. As a proxy for the amount extended by foreign banks we calculate the proportion of foreign participants in the syndicate, as is standard in the literature. Foreign loans are defined as syndicated loans underwritten by at least one lead bank headquartered outside the Eurozone. Further, for each loan we observe the amount, the currency denomination, the spread to benchmark at issuance (partially populated), the maturity of the loan in months, and can separate real investment purpose loans and loans raised for other purposes such as mainly refinancing and

[14] Because both domestic and foreign banks had exposures to Eurozone sovereigns and risked withdrawals by wholesale dollar depositors.

restructuring purposes (leveraged-buyouts, mergers and acquisitions). We include both term loans and credit lines. Our dataset is organized as a panel of firm-quarter observations with positive debt issuance. More than 25 percent of the loans issued in our sample are risky.

Table 1 reports the number of borrowers by country. Out of 3594 firms with a positive demand for credit[15], 1511 firms borrow from foreign banks, and 307 firms issue foreign currency loans during our sample period. The number of borrowers is broadly proportional to the size of countries. Table 2 gives the distribution of credit supplied by lender nationality before and during the credit crunch. In order to remove the effect of changes in the sample of firms tapping the market over time we focus only on firms that borrow in both periods. We observe several interesting facts. First of all, US banks are the largest foreign participants in the Eurozone market. Second, unlike all other lenders, US banks have a larger participation in the leveraged segment of the market than in the investment grade segment of the market: 28% for leveraged loans against 9% for investment grade loans during the credit crunch, consistent with the fact that being under Basel I gives US banks a greater incentive to load onto riskier corporate debt. Thirdly and most importantly, while domestic banks have reduced their participation in the leveraged segment of the market from 51% to 46% during the credit crunch, foreign banks, and most notably US banks, have increased their participation substantially from 49% to 54%. Last but not least, for all foreign banks, but again most notably US banks, we observe a dramatic increase in the proportion of credit denominated in US dollar. During the credit crunch 42% of US banks' loans are in US dollars against 11% before the credit crunch.

These observations are confirmed at the level of individual banks, comparing the lending behavior of the same bank over time. In Table3 we list the largest foreign lenders for which we

[15] Of this, 1501 issue more than one loan during our sample period.

calculate the percentage of their total lending (based on prorated figures) extended to risky Eurozone borrowers and the percentage of their total lending denominated in US dollar before and after the credit crunch. Overall, we see that US banks increase risk while UK and Japanese banks reduce risk during the credit crunch. And for all the banks we observe an increase in the percentage of lending denominated in US dollars, albeit stronger at US banks.

3.2. The 2007-2009 Financial Crisis in Europe

The first signs of the eruption of the US subprime crisis in Europe date back to February 2007 when HSBC announced unexpected losses of 10.5 billion USD and fired the head of its US mortgage lending business. European banks were directly involved in the US subprime market. This is true of all important participants in the syndicated loan market like Deutsche Bank and French banks Société Générale and BNP Paribas. According to Acharya and Schnabl (2009), European banks, notably German, Dutch, Belgian, and French banks, were large sponsors of structured investment vehicles (SIV's) and conduits. This shadow business was heavily invested in US dollar denominated subprime assets, mainly financed through the issuance of asset backed commercial paper (ABCP) in US dollar. When the ABCP market came to an abrupt halt in August 2007[16], banks were forced to take assets from SIV's and conduits back on their balance sheets. As the value of US subprime assets plummeted banks experienced large losses. The first banks that required support from their governments were not US banks but German banks IKS, Deutsche Industriebank, and Sachsen Landesbank. In August 2008 Bayern LB and IKB reported losses above 10 billion USD, more than what their capital position could support.

[16] Following the decision of BNP Paribas to suspend withdrawals from some of its hedged funds invested in US subprime mortgage backed securities due to the inability to mark these assets to markets.

As losses depleted capital, European banks tightened lending standards, leading to a sharp decline in the volume of activity in the syndicated loan market. Figure 1 shows the net percentage of Eurozone banks that report having tightened their lending standard for large firms in the past 3 months, average across all Eurozone countries.[17] There are important variations in this indicator over the sample period from -10% (loosening) at the 10th percentile to 42% (tightening) at the 90th percentile. Variations across countries (not shown) are important as well with an earlier, more persistent, and deeper tightening of lending standards in southern Eurozone countries. Syndicated loan issuance activity declined rapidly and persistently across all Eurozone countries irrespective of the purpose of the debt issued.

Growing uncertainty about the extent of subprime assets banks held on their balance sheet, the magnitude of the losses, and whether banks had enough capital to bear these losses, spread the crisis immediately to interbank markets. Banks became increasingly reluctant to lend to each other due to mounting counterparty risk and fear about their own ability to raise funding in the future. The global interbank market crisis reached a state of panic when Lehman Brothers filed for bankruptcy in September 2008 most unsecured sourced of funding eroded. Figure 3 depicts large spikes in the cost of funding in the euro and the dollar unsecured interbank markets measured by the difference between Euribor (or Libor USD) and overnight index swap spreads.

The inability to roll-over ABCP funding put pressure on the banks to find new sources of funding: being unable to raise dollar funding in the interbank market and facing growing needs to fund their dollar denominated assets European banks turned to foreign exchange swaps, a secured

[17] Although the method of calculation of this index is not harmonized across countries, that does not affect our analysis because our regressions include firms fixed effects. Three countries for which the index is not available, Greece, Finland, and Belgium, are excluded from the sample. From the same survey we also collected a measure of credit demand, the net percentage of banks reporting an increase in the demand for credit by large firms, for each Eurozone country.

form of funding. The surge in the demand for exchanging euros for dollars --synthetic dollar funding-- combined with limited capacity on the part of arbitrageurs[18] caused repeated deviations from covered interest parity. This is shown in Figure 4 which plots the deviation from CIP, the euro basis (the cost of synthetic dollar funding), defined above as Δ_t and using 3-month Euribor, dollar Libor and forward rates.[19]

Central banks liquidity injections and recapitalization plans adopted starting in 2009 helped restore orderly conditions in funding and credit markets until the eruption of the sovereign debt crisis. From Q2-2011 to Q2-2012 in response to heightened sovereign risk US money funds withdrew dollar deposits from exposed banks which led to a sharp increase in the euro basis. During this same period, and unlike the period 2007-2009, riskier borrowers experienced a sharp decline in dollar credit relative to euro credit, as shown in Figure 2.

4. The Lending Behavior of Foreign Banks during the Credit Crunch

We divide our analysis in two steps. First, we show how the composition and the distribution of credit between domestic and foreign banks changes during the credit crunch. Second, we analyze the effect of the Home credit crunch and then of the twin crises in the Home credit market and funding markets on the currency composition of loans. We document these effects separately for foreign banks that presumably have large euro deposits and for other foreign banks (US banks).

[18] According to Coffrey, Hrung, and Sarkar (2009) arbitrageurs had limited capacity to shrink the basis due to the inability to raise capital quickly and/or heightened counterparty risk.

[19] Interest rates and exchange rates are downloaded from Reuters.

4.1 The Shift to Foreign Banks

We study the cyclicality of foreign credit using the following baseline regression:

$$(1) \qquad y^1_{ijt} = c^1 + \theta^1_i + \gamma^1_t + \beta_1 CCI_{jt} * Not\ risky_{it} + \beta_2 CCI_{jt} * Risky_{it} + \beta_3 Risky_{it} + X_{jt}\beta_4 + \varepsilon_{ijt}$$

The left-hand side variable is a either a dummy that takes value 100 if firm *i* headquartered in country j borrows from a foreign bank[20] or the percentage of foreign banks in the syndicate. θ^1_i are firm fixed effects and γ^1_t time (year-quarter) fixed effects.[21] *Risky* is a dummy that indicates whether the loan is rated investment grade and *Not risky* whether it is rated below investment grade or not rated in a given quarter. When the dependent variable is a dummy, CCI_{jt} is a dummy indicating country-quarter observations when the net percentage of domestic banks reporting having tightened credit to large firms in the past three months is positive. When the dependent variable is a continuous variable, CCI_{jt} is the net percentage of domestic banks reporting having tightened credit to large firms in the past three months.[22]

We are interested in identifying the effect of a reduction in the domestic credit supply on the demand for foreign credit. Therefore we also include X_{jt} which is a vector of variables that capture changes in the supply of foreign credit and in the demand for foreign currency: interaction terms of *Risky* with the US policy rate, the dollar/euro exchange rate change, the EU-US interest rate differential, a survey measure of changes in the US demand for bank credit, and a

[20] In other words if it issues a syndicated loan at least partly subscribed by a foreign (extra-Eurozone) lead bank and zero if it issues a (fully) domestic loan.
[21] All our results are also robust to the inclusion of country*year fixed effects.
[22] We specify a linear probability model in order to include firms fixed effects. When both the dependent variable and the explanatory variable are dummies, ordinary least squares estimates and probit estimates are identical (see Angrist and Pischke, 2009).

survey measure of changes in the domestic demand for bank credit and its interaction with *Risky*.[23] Our estimates are not significantly altered if we do not include X_{jt}.

The inclusion of firm fixed effects is key to our analysis: it rules out the possibility that our results could be driven by changes over time in the composition of firms raising debt. And the fact that we focus on changes in the debt composition rather than the debt level means that we abstract from changes in the aggregate demand for debt. All the firms in our analysis have a positive demand for debt.

The coefficients of interest are β_1 and β_2 estimated by ordinary least squares. When the dependent variable is a dummy these coefficients are interpreted as average effects on the probability that a firm issues borrows from a foreign bank. If foreign credit is countercyclical we should verify that $\beta_2 > 0$.

The results of estimating equation (1) are reported in Table 4. In column I the dependent variable is the dummy for borrowing from a foreign bank rather than a domestic bank. The estimate of β_2 is positive and statistically and economically significant: at the extensive margin, foreign credit increases relative to domestic credit on average by 8.3 percentage points in quarters when domestic banks tighten credit standards. This shift is significant for both US and non-US foreign loans (not shown). If we now turn to the intensive margin of credit, the percentage of foreign lead banks in a syndicate in column II, the estimate of β_2 is not significant in the full sample, but it is statistically and economically significant if we restrict the sample to real purpose loans, column III. This result may be attributable to the fact that leveraged buyouts and mergers and acquisitions declined sharply during the crisis, hence it may be more pertinent to focus on real loans. In terms

[23] The net percentage of US (European) banks reporting an increase in the demand for credit. These measures are obtained from the Federal Reserve Board and the ECB websites, respectively.

of magnitude the shift to foreign banks is significant: an increase in *CCI* from the 10th percentile to the 90th percentile is associated with a 25 percentage point increase in the participation of foreign banks to real purpose loans. Also when we focus on US credit and eliminate non-US foreign loans from the sample, we find that US credit is countercyclical for both real and total loans, column IV. An increase in *CCI* from the 10th percentile to the 90th percentile is associated with a 9 percentage point increase in the participation of US banks to syndicated loans extended to riskier borrowers. The estimate of β_1 instead is small and statistically insignificant meaning that on average US banks shift their loan portfolio towards riskier borrowers when domestic banks reduce risk. This is consistent with the fact that, since US banks operate under Basel I, when domestic banks retreat from the leveraged segment of the market US banks seize the opportunity to increase returns by shifting from safe to risky corporate loans without consequences on their capital requirement. Instead when we exclude US credit from the sample we find that non-US foreign credit is acyclical, column V.

Interestingly, we find the shift to US banks to be positive and significant only for firms in high-exporting sectors (*High Export=1*), column VI.[24] For non-US foreign loans the estimate is either negative or insignificant, column VII. When we extend the sample period to 2013 instead we find that US credit is acyclical and non-US foreign credit is strongly procyclical (columns VIII-IX), consistent with the conjecture that heightened sovereign risk, through the threat of money market funds withdrawals, and the transition of US banks towards Basel II negatively impacted risk-taking.

[24] *HighExports =1* for a firm that belongs to a sector (2-digit SIC code) with a ratio of export sales over total sales above the median calculated over all sectors. The ratio by sector is calculated from a sample of more than 50 thousand firms that report export sales in the database Amadeus.

So far we have implicitly assumed that risky firms switch to foreign loans because domestic loans are becoming more expensive and not because foreign loans are becoming cheaper due to confounding factors. A competing interpretation for β_2 being positive is that foreign loans become more attractive independently of the deterioration of the domestic supply of bank credit. For example, foreign loans may become more attractive if the cost of funding of foreign banks falls relative to the cost of funding of domestic banks due to looser monetary policy abroad. We have already addressed this issue somewhat by controlling for the interaction of *Risky* with the US monetary policy rate.

To check this further, let i_{it}^{fR} and i_{it}^{fNR} be the foreign cost of credit for risky and non-risky firms. We want to test whether

$$\frac{d(i_{it}^{fR} - i_{it}^{fNR})}{dCCI_{jt}} < 0$$

That is, whether the difference in the cost of foreign credit between risky and safe borrowers varies negatively with *CCI*, indicating a positive correlation of *CCI* with heightened search for yield among foreign lenders.

For this we estimate equation (1) with the all-in-drawn spread to benchmark as dependent variable for foreign loans and domestic loans separately. We extend the list of control variables to include loan characteristics: issue size, currency denomination, maturity, an issue type dummy and a loan purpose dummy. The other control variables are as previously defined. Here too the inclusion of firm fixed effects is important since otherwise, because of flight to quality, spreads across periods would not be comparable.

The results are reported in Table 5. In column (1) for foreign loans the correlation between $CCI_{jt} * Risky_{it}$ and the cost of debt is nil, while in column (2) it is positive and statistically significant for domestic loans as one would expect. This means that the domestic credit crunch does not coincide with a period when foreign loans become cheaper than domestic loans for riskier borrowers. We can therefore more firmly confirm that riskier borrowers shift to foreign banks because they are financially constrained at home and not because foreign credit becomes more attractive.

In sum, we find that foreign banks increase their market share in the leveraged segment of the market during the domestic credit crunch, somewhat contributing to absorb the shock for those firms that suffer most from the reduction in the domestic credit supply. Next, we turn to studying whether this shift to foreign banks can explain the dramatic shift to foreign currency in light of the predictions of the model.

4.2 The Shift to Dollar

We first estimate an equation as in (1) but with the dependent variable being the percentage of debt issued in foreign currency by a given firm in a given quarter. In Table 6 we report separate results for the sample of loans to which US banks participate and for the full sample. The reason we proceed this way is that compared to UK or Swiss banks, US banks have small euro deposits, therefore if they lend more to European corporates, this increase in lending is more likely to be associated with a shift to dollar. This allows keeping currency risk and the associated capital requirement low.

We confirm this conjecture in column I. An increase in *CCI* from the 10^{th} percentile to the 90^{th} percentile is associated with a 25 percent increase in the proportion of newly issued US loans

denominated in foreign currency (mostly dollars). This shift to foreign currency is statistically significant only for foreign currency earners, column II. If we replicate columns I and II for the full sample however the shift to foreign currency is not visible.

Our model predicts that to explain the large shift to foreign currency credit during the Home credit crunch, we need a coincident increase in the relative cost of euro wholesale funding and/or in the cost of FX swaps ($D = D(i^E, i^D, \Delta)$). This will lead more foreign banks to increase credit in dollar relative to credit in euro. We test these predictions using the following specification which we run on the sample of quarters when domestic banks tighten credit standards (*CCI* > 0):

$$(2) \qquad y_{ijt}^2 = c^2 + \theta_i^2 + \gamma_t^2 + \delta_1 RP_t * Risky_{it} + \delta_2 Risky_{it} + \delta_3 X_{jt} + \varepsilon_{ijt}$$

Where RP_t is a vector including the euro interbank risk premium, the dollar interbank risk premium, and the Euro basis. The other variables are defined as in equation (1). Again our estimates are not significantly altered if we do not include X_{jt}.

In Table 7 we report estimates of δ_1.[25] As predicted by our model, we find that an increase in the euribor-ois spread (ERP) amplifies the shift to foreign currency during the Home credit crunch. A 100 basis point increase in ERP is associated with a 33 percentage point increase in the proportion of newly issued loans denominated in foreign currency for risky firms relative to non-risky firms, column I. An increase in the dollar interbank risk premium has the opposite effect. In column II we add the Euro basis which causes a drop in the effect of ERP but the estimate remains statistically and economically large. An increase in the Euro basis of 100 basis points is associated with a 25.8 percentage points increase in the proportion of newly issued loans

[25] If we estimate equation (2) on the full sample or the quarters when CCI<=0 all estimates are statistically insignificant. In line with our predictions disruptions in funding market cause a shift to dollar only in quarters when domestic banks restrict credit.

denominated in foreign currency for risky firms relative to non-risky firms. In column III, we allow for the estimates to differ in the sample of *High Export* and *Low Export* borrowers, and find as our model suggests that the effect of ERP is economically and statistically significant only in the sample of *High Export* borrowers or presumably foreign currency earners.

In columns IV and V we extend the sample period to 2013 and find that we are able to explain the sharp shift to dollar only if we exclude from the sample the period Q2-2011 to Q2-2012 when US money market funds threatened to withdraw deposits from banks exposed to risky Eurozone debt.

So far we have conjectured that the underlying mechanism through which ERP leads to a shift to foreign currency is that banks facing increased pressure in euro funding reduce their supply of euro credit relative to dollar credit. To check this supply effect more directly we estimate the pass-through of ERP on lending rates using equation (2). The dependent variable now is the all-in-drawn spread to benchmark. A main issue with estimating the pass-through is that it can be offset by the possibility that borrowers shift to an alternative currency as we have just shown. To circumvent this problem we estimate the pass-through only on the sample of domestic loans, which we take as indicative of what happens also for foreign loans. The results are reported in Table 8. Now we run separate regressions for ERP and the Euro basis due to the much smaller sample size and the high correlation between the two. In column I, we see that an increase in the funding cost in a given currency causes an increase in the lending rate in the respective currency. The pass-through of ERP (DRP) to the rate charged on euro (dollar) loans is large economically and statistically significant. An increase in ERP affects only rates charged on risky loans while the increase in DRP affects all loans irrespective of the credit quality. The estimate for ERP means that a 100 basis points increase in ERP is associated with a 336 basis points increase in the

rate charged on risky loans relative to not risky loans. In column II we report the Euro basis pass-through estimate and as expected an increase in the euro basis is associated with an increase in the rate charged on dollar loans by domestic banks, in other words a decline in the supply of dollar credit by domestic banks at the intensive margin.[26] This effect is larger for riskier borrowers.

4.3 Robustness Checks

We ran several additional robustness checks. First, we re-estimated all equations controlling for trade credit and its interaction with *Risky* measured at country and sector level. Trade credit and bank credit are linked. A reduction in domestic bank credit might cause an increase in trade credit as firms delay payments to providers. In that case trade credit is a substitute to bank credit. On the other hand, during a severe credit crunch, good firms experiencing a decline in credit could cut trade credit to bad firms. It is therefore unclear a priori in what direction controlling for trade credit will affect our estimates. We used two alternative data sources, the BACH database[27] and Amadeus Bureau van Dijk[28] which report accounts payable scaled by total sales as the measure of trade credit. Although we lose more than a fourth of our sample due to data being unavailable for some countries and/or some sectors, our results are barely altered.

We also analysed the shift from bank to bond finance and found that for risky firms bond finance[29] is procyclical while for investment grade firms it is countercyclical. Investment grade

[26] The estimates are quite large which suggests that Eurozone banks are facing a larger increase in the euro basis than what is reflected in the market wide average.
[27] Available at https://www.bach.banque-france.fr/
[28] Although these data are available at firm level we used country-sector averages because of the very imperfect matching between SDC platinum and Amadeus.
[29] The data source for bond issuance is SDC platinum. We included only non-convertible bonds and excluded mortgage backed-securities, asset-backed securities, and preference shares which are listed as bonds.

firms could issue domestic currency bonds as substitutes for domestic currency loans while risky firms could only tap on foreign currency credit sourced from foreign banks.

A second robustness exercise we ran is to modify our definition of domestic banks to include only banks headquartered in the same country as the borrower. This means that we reconsider the assumption that the Eurozone credit market is fully integrated. If we do that we continue to find that extra-Eurozone credit is countercyclical but that credit from non-domestic Eurozone banks is procyclical and that non-domestic Eurozone credit does not shift significantly toward dollar which confirms that our original definition of a domestic bank is more pertinent.

Thirdly, our results are robust to the inclusion of alternative measures of the stance of domestic and US monetary policy. The stance of monetary policy at home can differ across Eurozone countries due to differences in inflation rates and this might cause banks to take more risk in some Eurozone countries than in others. Controlling for the real interest rate therefore allows isolating the effect of variations in domestic banks' credit policy solely due to shocks to their capital position. In addition, we included the US long term rate interacted with *rRisky* to account for the main channel through which US unconventional monetary policies implemented since late 2008 could augment risk-taking by US banks. The fact that we found that changes in the stance of US monetary policy do not explain the increase in risk-taking by US banks supports our conjecture that regulatory capital arbitrage played its role.

All in all, we find that a twin crisis in the Home credit market and in funding markets explains the dramatic shift from euro credit to dollar credit observed of low-credit-quality Eurozone borrowers in 2007-2009. This shift to dollar is not channeled through a decline in trade credit or caused by the softening of US monetary policy.

In what follows we take the analysis of Section 4.1 one step further. Having shown that foreign credit is countercyclical, we now turn to an assessment of what this implies for the effect of the Home credit crunch on employment: did foreign bank credit mitigate firms' financial constraint?

5. Real Effect of Foreign Banking during the Credit Crunch

We test the real benefit of using a foreign bank relationship during the credit crunch. We follow in spirit Chodorow-Reich (2013) and estimate the effect of being exposed to a weak bank before the crisis on the change in employment between 2008 (peak) and 2010 (trough). We then extend his analysis with the comparison between firms that have a relationship with a foreign bank and firms that do not have such a relationship. The regression for the change in employment *E* reads:

$$(3) \qquad \Delta E_{ij} = \delta_j + \theta_s + \mu_1 \Delta_{-1} E_{ij} + \mu_2 Risky_i * Weak\ bank_i + \mu_3 Risky_i + \mu_4 Weak\ bank_i + X_i * \mu_5 + \varepsilon_{ij}$$

where $\Delta_{-1} E_{ij}$ is the lagged dependent variable; δ_j and θ_s are country and industry fixed effects. $Risky_i * Weak\ bank_i$ captures the exposure of firm i to the credit crunch: it is the interaction between the firm credit quality in 2007 and a dummy for borrowing from a bank involved in a co-syndication with a bank that failed since 2007, in the last pre-crisis syndicate. Ivashina and Scharfstein (2010) and Chodorow-Reich (2013) show that banks that had participated in a higher fraction of syndicates where Lehman had a lead lending role reduced new lending by more: firms that had credit lines from these syndicates drew down their lines by more as a precautionary measure following the disappearance of their main lender, and this led to a draining of liquidity from the other syndicate members. We consider that a bank has failed if it filed for bankruptcy, if

it was forced into merger, nationalized, or recapitalized with public funds. The data are from Mariathasan and Merrouche (2014).

X_i is a vector of variables which controls for credit demand (cash holdings before the credit crunch, whether the last pre-crisis debt issued was a credit line rather than a term loan or a bond, and whether the firm has a debt maturing during the credit crunch), access to the bond market, and other relevant firm characteristics (total assets and age). If foreign banking alleviates the financial constraint of firms we should expect μ_2 to be larger for firms that do not have a relationship with a foreign bank. A firm with a foreign bank relationship is defined as a firm that has borrowed from a bank headquartered outside the Eurozone at least once between 2004 and 2010 (our sample period).

To estimate regressions (3) we hand-matched the SDC data with the Bureau van Djink Amadeus data which contains the number of employees by firm and firms' balance sheet data. We could exactly match 691 firms and after eliminating firms that reported zero total assets in 2007 we were left with a sample of 471 firms and nine countries. Of these 471 firms 25% issue risky debt, and 288 firms had a relationship with a foreign bank. The growth rate of employment $\frac{E_i^{2010}-E_i^{2008}}{E_i^{2008}}$ is on average -2.5%, with large variations, the 10th percentile is -32%, after winsorizing the data at the 1% and 99% level.

Before we present the results from estimating equation (3), we report that our measure of exposure to the credit crunch is relevant. We estimate the effect of $Risky_i * weak_i$ on a dummy that indicates whether a firm borrowed during the Q3-2007/Q4-2009 credit crunch (ACCESS) and the difference in the average rate it paid during the credit crunch with the rate it paid on its last pre-crisis loan. Therefore the sample covers firms that borrowed before the credit crunch

going back to 2003. The results are reported in Table 9 including a full range of pre-crisis loans characteristics, fixed effects for the year of the last pre-crisis loan, borrower industry and country fixed effects, and controls for the demand for credit (bond market access and a dummy for whether a debt matures during the crisis). What we find is that higher exposure to the credit crunch is associated with a 10 percent lower probability of obtaining a loan during the crisis. This is statistically significant in the sample of firms that have no foreign bank relationship and in the full sample (not reported). The difference between firms with and without a foreign bank relationship is statistically significant at the intensive margin of credit: exposed firms are charged a lending rate 110 basis points above their pre-crisis rate when they do not have a foreign bank relationship. The effect is however small and insignificant statistically if the firm has a foreign bank relationship.

We now turn to the results of estimating equation (3) reported in Table 10. We find that the credit crunch leads to a significant decline in employment for exposed firms that do not have a foreign bank relationship (column I), but not for exposed firms that have a foreign bank relationship (column II). The difference between the two columns is statistically and economically significant. Employment declines by 27% on average during the credit crunch for the exposed firms with no foreign bank relationship, which roughly corresponds to the 15th percentile of our sample. This effect encompasses not only the effect of obtaining a loan but also the effect of a decline in the amount of credit, the effect of an increase in the spread, shorter maturities, as well as the effect of uncertainty of future credit availability given labor adjustment costs.

In columns III and IV we assess the mitigating role of foreign banks using a triple interaction of $Risky_i * Weak\ bank_i$ with the percentage of foreign banks in the last pre-crisis loan or with the average percentage of foreign lenders during the period Q1-2004 to Q2-2007. A positive

coefficient on the triple interaction $Risky_i * Weak\ bank_i * \%\ foreign\ bank$ confirms that the effect of the credit crunch on employment is lower for firms that rely more on foreign banks before the crisis.

6. Conclusion

The increase in dollar borrowing by non-investment grade Eurozone firms in the recent financial crisis is a puzzling phenomenon. In this paper, we propose an explanation that is consistent with the empirical analysis. The existing literature emphasizes the role of demand side factors in determining the currency denomination of debt, mainly the borrower's export intensity or foreign currency income and the interest rate differential between domestic and foreign currency loans. In this paper we have shown that during a liquidity crisis supply side factors matter: an increase in the relative cost of funding in domestic currency, which reduces the supply of credit by domestic lenders and curbs the willingness of foreign lenders to bear currency risk, causes a shift to foreign currency credit. This is true provided that foreign credit is countercyclical. We show that this was the case in Europe during the period 2007-2009, so that foreign banks had a stabilizing role.

The way bank capital is regulated appears to play an important role in the process. The fact that US banks operated under Basel I meant that they had an incentive to shift to riskier corporate loans when Eurozone banks retrenched. Our analysis therefore illustrates how the move from Basel I to Basel II with risk-sensitive capital requirements has contributed to amplify the credit

cycle. Basel III goes some way towards addressing the problem through the introduction of mandatory buffers, a capital preservation buffer and a countercyclical buffer, that are built-up in good times and can be released in bad times to avoid a credit crunch.

Since 2009 the rise in offshore dollar credit has spread to emerging markets. This expansion, however, has not been fueled by a domestic credit crunch, but rather by low US interest. Contrary to the Eurozone experience in 2007-2009, this increase in foreign currency credit has been procyclical and may threaten financial stability as it stimulates credit booms. The financial systems in these countries are then vulnerable to sudden withdrawals, exchange rate risk, and sudden rises of foreign interest rates.

References

Acharya V.V., T. Eisert, C. Enger, and C. Hirsch (2014). Real Effects of the Sovereign Debt Crisis in Europe: Evidence from Syndicated Loans. Working paper NYU Stern.

Acharya,V.V, and P. Schnabl (2009). "Do Global Banks Spread Global Imbalances: Asset-Backed Commercial Paper during the Financial Crisis of 2007–09", IMF Economic Review 58 (1), 37-73.

Aghion, Ph., Bacchetta, Ph., and Banerjee, A. (2004). A Corporate Balance-sheet Approach to Currency Crises, Journal of Economic Theory 119, 6–30.

Angrist, J. and J. Pischke (2009). Mostly Harmless Econometrics, Princeton University Press.

Becker, B. and V. Ivashina (2014). Cyclicality of Credit Supply: Firm Level Evidence. Journal of Monetary Economics, 62, 76-93.

Bentolila S., Jansen M., Jiménez G., and S. Ruano (2013). When Credit Dries Up: Job Losses in the Great Recession. Working paper CEMFI.

Broner, F., T. Didier, A. Erce, and S. Schmukler, (2013). Gross Capital Flows: Dynamics and Crises. Journal of Monetary Economics 60, 113-133.

Brown M, Kirschenmann K, and S. Ongena (2013). Foreign Currency Loans - Demand or Supply Driven? Journal of Money, Credit and Banking, Forthcoming

Brown M., Ongena S., and P. Yeşin (2011). Foreign Currency Borrowing by Small Firms in the Transition Economies. Journal of Financial Intermediation 20: 285-302

Bruno V. and R. Hauswald (2013). The Real Effect of Foreign Banks. Working paper American University.

Burnside, C., Eichenbaum, M. and Rebelo S. (2004). Government Guarantees and Self-Fulfilling Speculative Attacks. Journal of Economic Theory 119, 31-63.

Calderon, C. and M. Kubota (2012). Gross Inflows Gone Wild: Gross Capital inflows, Credit Booms and Crises. The World Bank Policy Research, 6270, November.

Cetorelli, N. and L. S. Goldberg (2011). Global Banks and International Shock Transmission: Evidence from the Crisis. IMF Economic Review 59, 41–76.

Chodorow-Reich G. (2013). The Employment Effect of Credit Market Disruptions: Firm-Level Evidence from the 2008-9 Financial Crisis. The Quarterly Journal of Economics, October, 1-59.

Cingano F., F. Manaresi, and E. Sette (2013). Does Credit Crunch Investments Down? New Evidence on the Real Effects of the Bank-Lending Channel. Working paper, Bank of Italy.

Coffey, N., W. B. Hrung, and A. Sarkar (2009). "Capital Constraints, Counterparty Risk, and Deviations from Covered Interest Rate Parity." Federal Reserve Bank of New York Staff Reports, no. 393, September.

Duchin, R. and D. Sosyura (2014), Safer Ratios, Riskier Portfolios: Banks' Response to Government Aid. Journal of Financial Economics (113), 1-28.

Giannetti, M. and L. Laeven, (2012a). The Flight Home Effect: Evidence from the Syndicated Loan Market during Financial Crises. Journal of Financial Economics, 104 (1), 23-43.

Giannetti, M. and L. Laeven (2012b). Flight Home, Flight Abroad, and International Credit Cycles. American Economic Review 102, 219-224.

Haltenhof S., L. Seung Jung, and V. Stebunovs (2014). The Credit Crunch and Fall in Employment during the Great Recession. Journal of Economic Dynamics and Control, vol. 43, 31-57.

Haselmann R. and P. Wachtel (2011). Foreign Banks in Syndicated Loan Markets. Journal of Banking and Finance, Volume 35, 2679-2689.

Holmstrom B. and J. Tirole (1997). Financial Intermediation, Loanable Funds, and the Real Sector. The Quarterly Journal of Economics, 112 (3), 663-691.

Ivashina V. and D. Scharfstein (2010). Bank Lending During the Financial Crisis of 2008. Journal of Financial Economics, 97 (3), 319-338.

Ivashina, V., David S. Scharfstein, and J. C. Stein. (2012). Dollar Funding and the Lending Behavior of Global Banks. NBER Working Paper No. 18528.

Jeanne, O. (2005). Why Do Emerging Economies Borrow in Foreign Currency? in Other People's Money, B. Eichengreen and R. Hausmann eds., Chicago: University of Chicago Press, 190-217.

Keloharju, M. and M. Niskanen (2001). Why Do Firms Raise Foreign Currency Denominated Debt? Evidence from Finland. European Financial Management 7, 481-496.

Laeven L. and F. Valencia (2013). The Real Effects of Financial Sector Interventions during Crisis. Journal of Money, Credit, and Banking, Volume 45, Issue 1.

Mariathasan M. and O. Merrouche (2012). Recapitalization, Credit, and Liquidity. Economic Policy, 27, (72), 603-646.

McCauley, R. N., P. McGuire, and V. Sushko (2015). Global Dollar Credit: Links to US Monetary Policy and Leverage. BIS Working Paper No. 483.

Milesi-Ferretti, G.-M. and C. Tille (2011). The Great Retrenchment: International Capital Flows during the Global Financial Crisis. Economic Policy 66, 289-346.

Popov, A. and N. van Horen (2015). Exporting Sovereign Stress: Evidence from Syndicated Bank Lending during the Euro Area Sovereign Debt Crisis. Review of Finance 19, 1825-1866.

Rose, A., and T. Wieladek (2014). Financial Protectionism: The First Tests. Journal of Finance 69, 2127-2149.

Schneider, M. and A. Tornell (2004). Balance Sheet Effects, Bailout Guarantees and Financial Crises. Review of Economic Studies 71, 883-913.

Uhlig H. and F. De Fiore (2013). Corporate Debt Structure and the Financial Crisis. Working paper ECB.

Figure 1. Syndicated loan issuance denominated in US dollar

The sample includes all non-financial Eurozone borrowers.

Source: Thomson-Reuters Dealscan

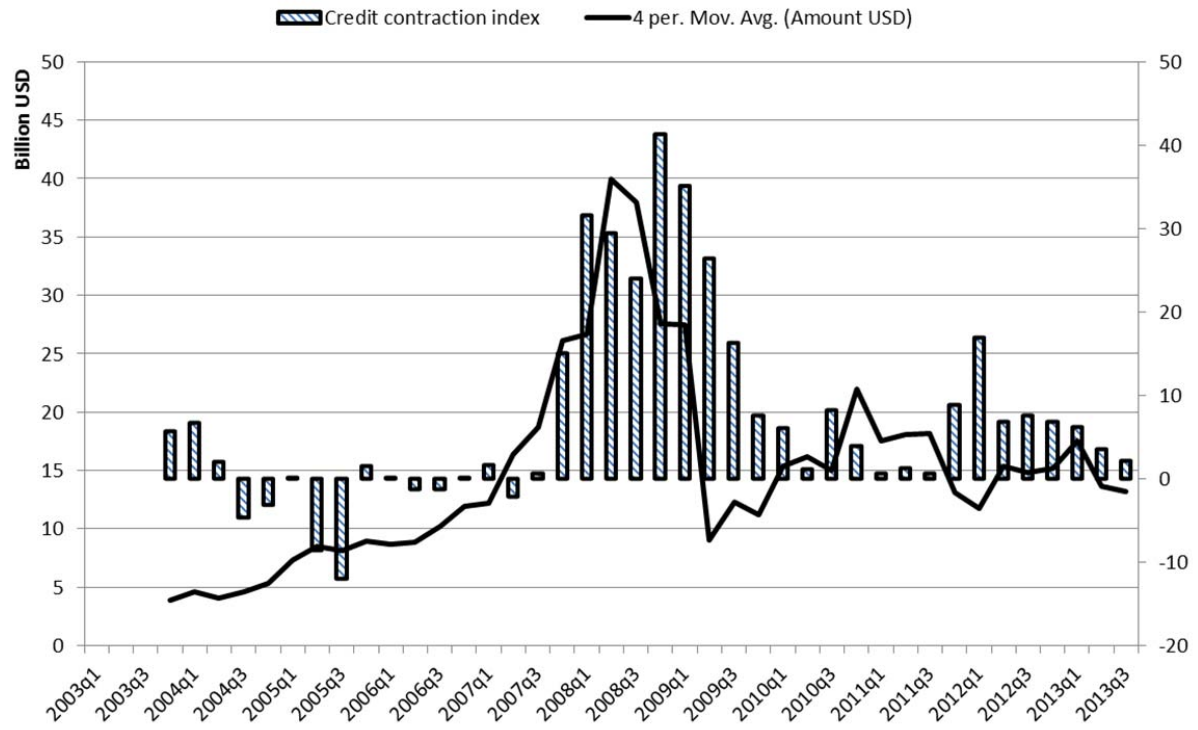

Figure 2. Percentage of syndicated loan issuance denominated in US dollars by borrower risk type

Risky borrowers are rated below investment grade. The sample includes all non-financial Eurozone borrowers. The vertical bars mark the start and end of the US money market fund shock.

Source: Thomson-Reuters Dealscan, authors' calculation

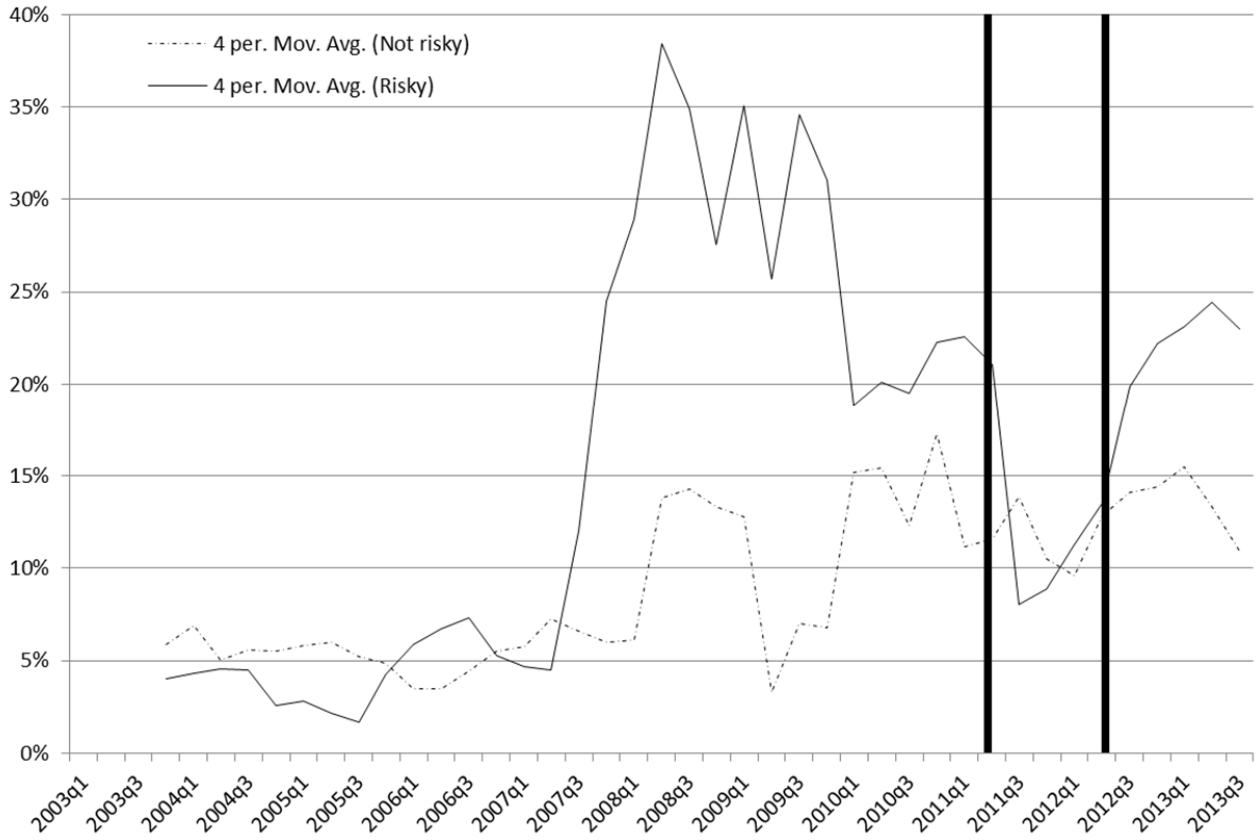

Figure 3. Stress in the interbank market

Source: Datastream

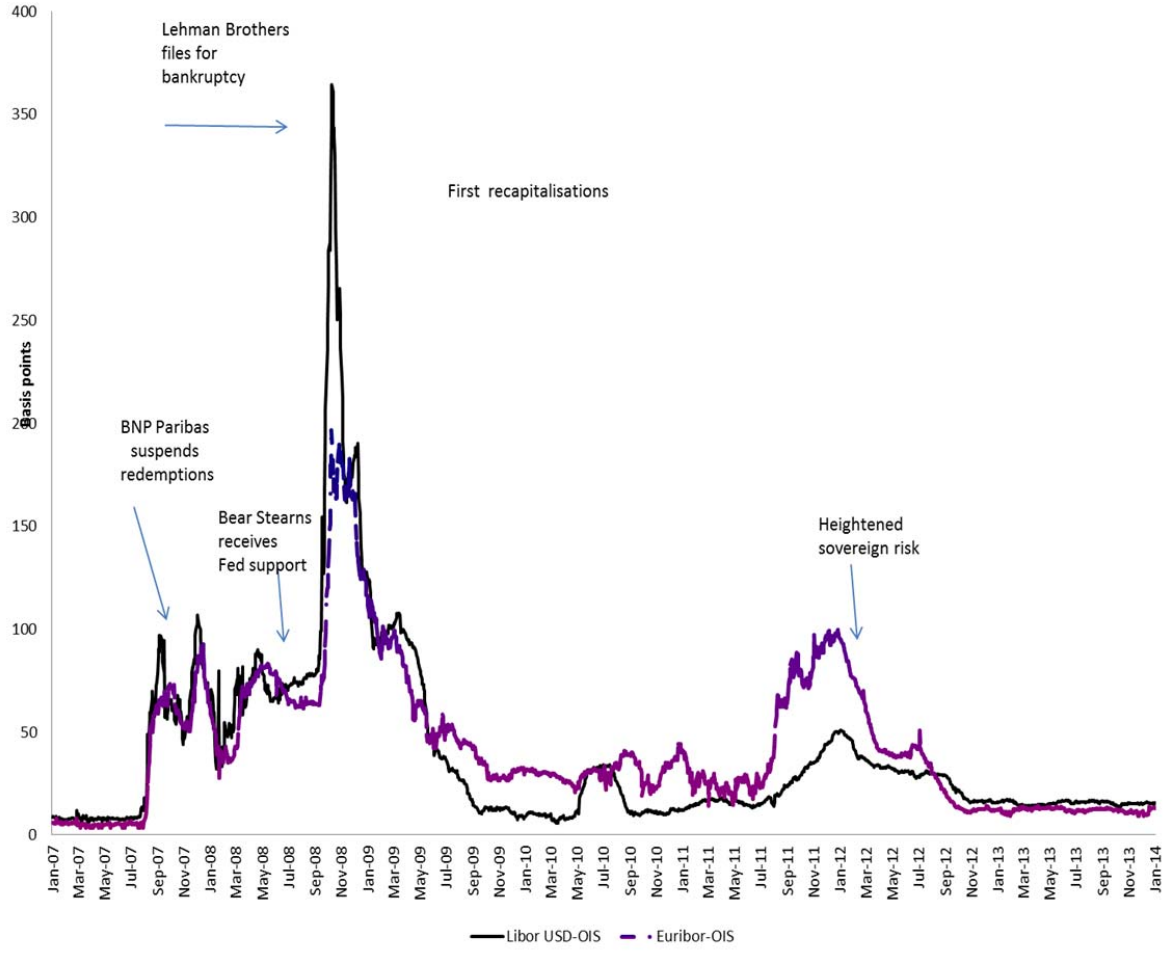

Figure 4. Deviation from covered interest parity measured by the Euro basis (basis points).

The Euro basis is constructed using 3 month daily euribor-OIS spread, 3 month daily dollar libor-OIS spread, and 3 month daily spot and forward rates downloaded from Datastream.

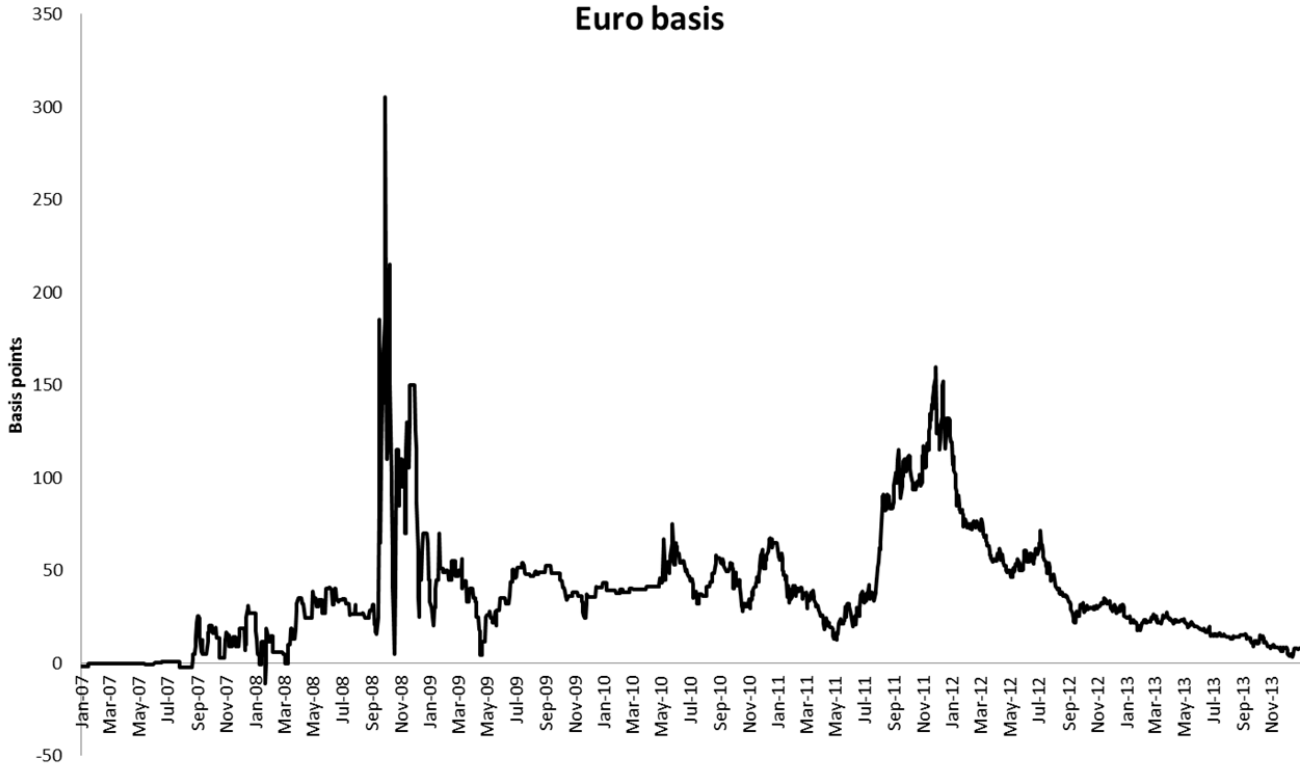

Table 1. Sample composition by country

This table reports the composition of our SDC Platinum sample by country. The sample period is 2004-Q1 to 2009-Q4. Loans include both credit lines and term loans. In column I we report the number of firms with positive syndicated loan issuance by country over the sample period; in column II the number of issuers that have borrowed at least once from a foreign bank; and in column III the number of issuers that have borrowed at least once in foreign currency.

Country	Number of issuers	Number of issuers with a foreign bank relationship	Number of foreign currency issuers
	I	II	III
Austria	27	15	2
Belgium	90	44	10
Finland	70	66	2
France	856	337	59
Germany	622	270	56
Greece	77	45	21
Ireland	72	39	18
Italy	528	120	24
Luxembourg	44	35	11
Netherlands	296	190	54
Portugal	160	29	11
Spain	752	321	39
Total	3594	1511	307

Table 2. Distribution of Eurozone syndicated loan activity by lender nationality

This table reports market shares by lender nationality before and during the credit crunch based on amounts pro-rated by the number of participating banks. In order to abstract from changes in the population of firms tapping the market at different times these shares are calculated on the sample of firms that have a positive demand for credit in both periods. We report total market shares, and separately market shares for the leveraged segment and the investment grade segment of the market. Finally, we report the percentage of lending that is the US dollars.

Q1-2004/Q2-2007

	% Total lending	% Risky	% Not Risky	% USD
US banks	17%	24%	16%	11%
UK banks	9%	8%	9%	10%
Japenese banks	3%	1%	3%	8%
Other banks	12%	15%	12%	8%
All foreign banks	41%	**49%**	40%	10%
Eurozone banks	59%	**51%**	60%	7%

Q3-2007/Q4-2009

	% Total lending	% Risky	% Not Risky	% USD
US banks	14%	28%	9%	42%
UK banks	9%	9%	9%	20%
Japenese banks	4%	1%	5%	26%
Other banks	14%	15%	14%	25%
All foreign banks	41%	**54%**	38%	30%
Eurozone banks	59%	**46%**	62%	15%

Table 3. Largest foreign participants in the Eurozone syndicated loans market

This tables reports the percentage of total lending by each listed bank to risky (non-investment grade) Eurozone borrowers, and the percentage of total lending denominated in US dollars. The numbers correspond to *pro-rated* figures.

	Q1-2004/Q2-2007		Q3-2007/Q4-2009	
	Risky	Dollar	Risky	Dollar
UK and Swiss banks				
Barclays	25%	11%	22%	20%
Lloyds	46%	9%	31%	22%
Royal Bank of Scotland	40%	11%	35%	24%
Crédit Suisse	45%	9%	47%	41%
US banks				
BOA-Merrill Lynch	35%	19%	38%	36%
Citibank	20%	21%	32%	31%
Goldman Sachs	42%	9%	59%	37%
JP-Morgan	44%	25%	54%	44%
Morgan-Stanley	38%	12%	48%	30%
Japanese banks				
Mitsubishi-UFJ	7%	10%	6%	16%
Namura-INC	70%	8%	71%	36%
Sumitomo	18%	7%	10%	16%
Mizuho	36%	11%	13%	19%

Table 4. Countercyclicality of foreign credit

The dependent variable in column I is a dummy that takes value 100 for foreign loans (loans at least partially led by a non-Eurozone bank) and zero otherwise. In other columns the dependent variable is the percentage of foreign banks in the syndicate. *Risky* indicates whether a firm is rated non-investment grade and *Not risky* whether it is rated below investment grade or not rated in a given quarter. *CCI* is the net percentage of Eurozone banks that tightened lending standards to large firms in the previous 3 months. I(.) is an indicator function. *High (Low) Export* are borrowers in sectors with export sales over total sales above (below) the median. Standard errors reported in parentheses are heteroskedasticity-robust and clustered by country*year. All columns include firm fixed effects, year-quarter fixed effects, and the Eurozone-US policy rate differential interacted *Risky*, the euro-dollar exchange rate change interacted with *Risky*, the Fed target rate interacted with *Risky*, the borrower home country credit demand index and its interaction with *Risky*, and the US credit demand index and its interaction with *Risky*. The data are quarterly for the period 2004-Q1 to 2009-Q4, unless specified otherwise. * $p<0.1$; ** $p<0.05$; *** $p<0.01$

	I	II	III	IV	V	VI	VII	VIII	IX
			Real purpose loans	Excludes non-US foreign loans	Excludes US loans	Excludes non-US foreign loans	Excludes US loans	Excludes non-US foreign loans 2004-2013	Excludes US loans 2004-2013
Risky	-6.473	-2.115	-7.679	-0.201	-6.796	-0.150	-6.349	2.177	-0.593
	(5.772)	(2.905)	(6.026)	(3.526)	(3.081)**	(3.537)	(3.095)**	(2.108)	(1.679)
I(CCI>0)*Not Risky	-6.698								
	(2.034)***								
I(CCI>0)*Risky	**8.286**								
	(3.286)**								
CCI*Not Risky		-0.069	-0.027	0.002	-0.124	0.003	-0.135	-0.066	-0.163
		(0.043)	(0.112)	(0.054)	(0.053)**	(0.054)	(0.052)**	(0.041)	(0.040)***
CCI*Risky		0.038	**0.496**	**0.186**	-0.096			0.014	-0.136
		(0.087)	**(0.149)*****	**(0.083)****	(0.103)			(0.067)	(0.052)**
CCI*Risky*High Export						**0.224**	-0.222		
						(0.076)***	(0.132)*		
CCI*Risky*Low Export						0.142	0.043		
						(0.122)	(0.105)		
R^2	0.04	0.03	0.12	0.06	0.04	0.06	0.04	0.06	0.04
N	4,466	4,466	1,529	3,236	3,761	3,236	3,761	5,312	6,113

Table 5. Alternative hypothesis: heightened search for yield in foreign credit

The dependent variable is the cost of debt measured by the all-in-drawn spread to benchmark. The sample period is Q1-2004 to Q4-2009 and the variables are as defined in Table 4. All columns include firm fixed effects and year-quarter fixed effects, and control for issue type fixed effects, issue size, maturity in months, and issue purpose. All columns also include the Eurozone-US policy rate differential interacted *Risky,* The euro-dollar exchange rate change interacted with *Risky,* the Fed target interacted with *Risky,* the borrower home country credit demand index and its interaction with *Risky*, and the US credit demand index and its interaction with *Risky*. We exclude firm-quarters with zero debt issuance. Standard errors reported in parentheses are heteroskedasticity-robust and clustered by country*year.

	I	II
	Foreign loans	Domestic loans
Risky	1.050	3.626
	(0.842)	(0.936)***
CCI	0.020	0.027
	(0.009)**	(0.012)**
CCI*Risky	0.043	0.089
	(0.027)	(0.034)**
R^2	0.08	0.45
N	1,556	1,860

* $p<0.1$; ** $p<0.05$; *** $p<0.0$

Table 6. The credit crunch and the shift to dollar

The dependent variable is the percentage of debt issued in foreign currency (mostly dollar). The sample period is Q1-2004 to Q4-2009 andthe variables are as defined in Table 4. Standard errors are heteroskedasticity-robust and clustered by country*year. All columns include firm fixed effects, year-quarter fixed effects, and the Eurozone-US policy rate differential interacted *Risky,* the euro-dollar exchange rate change interacted with *Risky,* the Fed target interacted with *Risky,* the borrower home country credit demand index and its interaction with *Risky*, and the US credit demand index and its interaction with *Risky*.

	I	II	III	IV
	US loans		All loans	
Risky	1.939	1.896	2.825	2.803
	(4.879)	(4.972)	(1.958)	(1.963)
CCI	-0.142	-0.144	-0.005	-0.002
	(0.189)	(0.190)	(0.074)	(0.073)
CCI*Risky	**0.480**		0.011	
	(0.198)**		(0.071)	
CCI*Risky*High Export		**0.587**		0.056
		(0.179)***		(0.095)
CCI*Risky*Low Export		0.411		-0.033
		(0.300)		(0.096)
R^2	0.11	0.11	0.02	0.02
N	705	705	4,466	4,466

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

Table 7. Funding markets disruptions and the shift to dollar

The dependent variable is the percentage of debt issued in foreign currency (mostly dollar). *ERP* is the *euro risk premium* (the difference between 3 month Euribor and equal maturity OIS euro) and *DRP* is the *dollar risk premium* (the difference between 3 month Libor USD and equal maturity OIS USD). The other variables are as defined in Table 4. All columns include firm fixed effects, year-quarter fixed effects, and the Eurozone-US policy rate differential interacted *Risky*, the euro-dollar exchange rate change interacted with *Risky*, the Fed target interacted with *Risky*, the borrower home country credit demand index and its interaction with *Risky*, and the US credit demand index and its interaction with *Risky*. The data cover quarters when there is a positive net percentage of Eurozone banks that report having tightened lending standards to large firms in the previous 3 months. The data are quarterly for the period 2004-Q1 to 2009-Q4, unless specified otherwise. Standard errors are heteroskedasticity-robust and clustered by country*year.

	I	II	III	IV	V
				2004-2013	Exclude Q2-2011-Q2-2012
Risky	3.286	4.991	6.639	2.603	2.855
	(2.397)	(2.547)*	(3.137)**	(1.944)	(2.487)
ERP*Risky	33.980	18.581		2.775	35.732
	(12.565)***	(6.287)***		(6.646)	(14.867)**
DRP*Risky	-15.536	-18.667		-2.130	-16.033
	(6.030)**	(7.510)**		(3.385)	(6.730)**
Euro basis*Risky		25.836			
		(13.962)*			
ERP*Risky* High Export			20.573		
			(6.993)***		
ERP*Risky* Low Export			7.647		
			(11.112)		
DRP*Risky* High Export			-17.390		
			(9.644)*		
DRP*Risky*Low Export			-18.316		
			(6.841)**		
Euro basis*Risky* High Export			24.873		
			(13.591)*		
Euro basis*Risky*Low Export			31.640		
			(17.249)*		
R^2	0.12	0.12	0.12	0.05	0.09
N	2,270	2,270	2,270	3,968	2,749

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

Table 8. The pass-through of funding costs to lending rates

The dependent variable is the all-in-drawn spread to benchmark. *Euro (Dollar)* loan indicates whether the issue is denominated in euro (dollar). The other variables are as in Table 7. The regressions include firm fixed effects, year-quarter fixed effects, log amount borrowed, loan purpose, and maturity Standard errors are heteroskedasticity-robust and clustered by country*year. The data cover Eurozone bank loans and quarters when there is a positive net percentage of Eurozone banks that report having tightened lending standards to large firms in the previous 3 months. The data are quarterly for the period 2004-Q1 to 2009-Q4. * $p<0.1$; ** $p<0.05$; *** $p<0.01$

	I	II
Risky	-0.656	0.045
	(0.997)	(1.062)
ERP*Euro loan*Risky	3.355	
	(1.191)***	
DRP*Dollar loan*Risky	0.983	
	(0.616)	
ERP*Euro loan	0.672	
	(0.625)	
DRP*Dollar loan	2.543	
	(0.801)***	
Dollar loan	0.412	0.325
	(1.023)	(1.040)
Euro basis*Dollar loan*Risky		2.928
		(1.651)*
Euro basis*Dollar loan		2.130
		(0.412)***
R^2	0.81	0.81
N	1,047	1,047

Table 9. Mitigating role of foreign banks I

The dependent variable in columns I-III is a dummy that indicates whether the firm has been able to borrow during the period Q3-2007 to Q4-2009. In columns IV to VI it is the average all-in-drawn spread to benchmark during the credit crunch minus the spread paid on the last pre-crisis loan. *Weak bank* is a dummy that takes value 1 if the firm's last pre-crisis syndicate included a lead bank that was resolved during the crisis. The regressions include borrower country and industry fixed effects, and last pre-crisis loan characteristics: risk type, log amount borrowed, loan type, maturity, and year of issuance dummies. Further to control for demand for credit we include: a dummy for bond market access and a dummy indicating whether a debt is maturing during the crisis. The estimates are reported on the sample of firms without and with a foreign bank (FB) relationship. Standard errors are heteroskedasticity-robust and clustered by country. * $p<0.1$; ** $p<0.05$; *** $p<0.01$

	I	II	III	IV
	ACCESS		SPREAD	
	Without FB relationship	With FB relationship	Without FB relationship	With FB relationship
Risky	0.076	0.064	6.330	54.913
	(0.049)	(0.104)	(37.104)	(92.254)
Weak bank	0.000	0.031	-17.968	4.711
	(0.046)	(0.120)	(17.648)	(14.733)
Risky*Weak bank	-0.096	-0.114	114.866	-8.783
	(0.042)**	(0.126)	(25.900)***	(91.394)
R^2	0.16	0.19	0.59	0.75
N	890	916	135	255

Table 10. Mitigating role of foreign banks II

The dependent variable is the symmetric employment growth rate for a given firm between 2008 and 2010. We report separate regressions for the sample of firms with and without a pre-2008 US relationship. *Weak bank* is a dummy that takes value 1 if the firm's last pre-crisis syndicate included a lead bank that was resolved during the crisis. *% foreign bank* is the percentage of foreign lead banks in the last pre-crisis syndicate or the average over the 3 years before the crisis. We include 2-digit SIC code fixed effects, country fixed effects, log total assets, log age, and last pre-crisis loan characteristics: the spread, maturity, loan type, and year of issuance. Further, to control for demand for credit we include: a dummy for bond market access, a dummy indicating whether a debt is maturing during the crisis, the ratio of cash over total assets in 2007, and reliance on trade credit in 2007 (measured by accounts payable scaled by total sales). The estimates are reported on the sample of firms without and with a foreign bank relationship. Errors are clustered by country. * p<0.1; *** p<0.01.

	I	II	III	IV
	Without FB relationship	With FB relationship	Full sample	Full sample
Risky	0.149	-0.221	0.059	0.056
	(0.089)	(0.238)	(0.066)	(0.066)
Weak bank	0.051	-0.165	-0.003	-0.004
	(0.044)	(0.133)	(0.031)	(0.032)
Risky*Weak bank	-0.267	0.116	-0.204	-0.201
	(0.066)***	(0.233)	(0.056)***	(0.060)***
Risky*Weak bank*% foreign bank *(Last pre-crisis loan)*			0.195	
			(0.031)***	
Risky*Weak bank*% foreign bank *(Average Q1-2004 to Q2-2007)*				0.173
				(0.040)***
R^2	0.27	0.22	0.17	0.17
N	183	267	450	450

* *p*<0.1; ** *p*<0.05; *** *p*<0.01