

Countercyclical Foreign Currency Borrowing: Eurozone Firms in 2007-2009

Philippe Bacchetta
University of Lausanne
Swiss Finance Institute
CEPR

Ouarda Merrouche
University Paris-Nanterre
EconomiX

November 2016

Abstract

Using syndicated loan-level data we document and explain the causes and implications of a new and surprising stylized fact. In the midst of the financial crisis, dollar borrowing by leveraged Eurozone corporates rose dramatically relative to their euro borrowing. We show that this resulted from a shift from domestic to foreign, mainly US, banks. This was combined with an increase in the proportion of dollar lending by foreign banks, explained by a rise in the relative cost of euro wholesale funding and the disruptions in the FX swap market. Foreign banking thus acted as a shock absorber during the 2007-2009 credit crunch in Europe.

JEL classification numbers: G21, G30, E44

Keywords: Money market, swaps, credit crunch, corporate debt, foreign banks.

Philippe Bacchetta (corresponding author), Internef 523, Faculty of Business and Economics, University of Lausanne, 1015 Lausanne, Switzerland, philippe.bacchetta@unil.ch; Ouarda Merrouche, Faculty of Business and Economic, University of Paris-Nanterre, Bâtiment G, 200, Avenue de la République 92001 Nanterre cedex, France, ouarda.merrouche@eui.eu.

1. Introduction

A wave of substantial financial disintegration has been observed during the recent financial crisis. In this context it is surprising that foreign currency borrowing by many Eurozone non-financial corporates increased dramatically from an average of 5 billion USD during 2004-2006 to a peak of 40 billion in 2008 (solid red 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).¹ 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. We argue that the increase in foreign currency borrowing by Eurozone leveraged² firms can be explained by the distinct reactions of European and US banks (the main foreign lenders in the Eurozone syndicated loan market) to the financial crisis. Moreover, these reactions are related to two main (and perhaps related) symptoms of the global financial crisis: the domestic (currency) 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.³

¹ 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.

² 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.

³ 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.

During the financial crisis, US banks partly replaced Eurozone banks in loans to riskier firms. A potential explanation is the difference in banking regulation. During this period and until 2014 US lenders operated fully under Basel I, while Eurozone banks were under Basel II.⁴ Under the Basel I framework, the risk weight on risky and safe corporate debt is the same. This means that US banks had greater incentive than Eurozone banks to load onto risky corporate debt as their capital position deteriorated due to subprime losses.⁵ Another difference for US banks is that they received capital support from the US government earlier than other banks. However, the first wave of capital injection took place in Q4-2008 which is later than the shift toward US credit and dollar borrowing we document.

To explain the shift towards foreign currency, 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 risky firms to borrow from foreign banks and the coincident disruption in the euro interbank market pushes foreign banks reliant on wholesale funding away from lending in euros. We also show that an increase in the cost of swapping euro into dollar, caused by the drying up of unsecured dollar funding, leads firms to increase their demand for foreign dollar credit.

⁴ 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.

⁵ 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.

We decompose our empirical analysis into three steps. In a first step we verify that foreign credit to more risky firms 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 and extensive margins is attributable to US banks and that it 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 risky firms in export-intensive sectors.

Thirdly, we ask whether all this matters in real terms: we assess the real effect of foreign banking using instrumental variables to correct for unobservable differences between borrowers with and without a foreign bank relationship. We report relevant statistical tests that validate our instruments. We find that foreign banking alleviates the financial constraints of Eurozone firms: during the credit contraction of 2007-2009, riskier firms exposed to a weak domestic lender pay a lower spread on new loans issued and do not cut employment when they have also a prior relationship with a foreign bank.⁶

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 (i.e. compositional changes rather than levels) means that our results cannot be driven by changes in the population of firms tapping

⁶ We measure exposure to a weak domestic bank by a dummy indicating whether the last pre-crisis syndicate included the participation of a domestic bank that received public capital support, was forced into merger, or filed for bankruptcy between 2007 and 2010. The data are from Merrouche and Mariathasan (2012).

different forms of finance over time or by changes in the aggregate demand for debt. The effects we document are also for the same reason not related to changes over time in the capacity of firms to raise 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 baseline 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). 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., 2015). 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. The countercyclicality of foreign lending that we

document in this paper therefore contrasts with the existing evidence. However, the previous literature had not focused on the differences in capital regulation and therefore did not document heterogeneous lending behavior across banks of different nationality.

Our findings on the role of foreign banks extend earlier work by Haselmann and Watchel (2011) and Bruno and Hauswald (2014). 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 (2014) 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 other 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 results 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.⁷ 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, 2014, Brown, Ongena, and Yeşin, 2011). However, there is little work on advanced economies. For the recent financial crisis, an exception is Ivashina et al. (2015) 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.⁸ 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. Section 2 presents our data sources and gives a historical background of the twin crises in the credit market and in funding markets. In Section 3 we develop the theoretical hypotheses. 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.

⁷ For theoretical papers, see Aghion et al. (2004), Burnside et al. (2004), Jeanne (2005), or Schneider and Tornell (2004).

⁸ 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. 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. Our model will then show 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.

2.1. 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 understand the sharp increase in dollar borrowing during the 2007-2009 financial crisis we use data for the period 2004-2009. Back-of-the-envelope calculations reveal that syndicated credit are a significant source of financing for European firms, accounting for about a third of all financing as of the end of our sample period.⁹

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.

⁹ Using IMF and BIS data for 2009, we find that the ratio of total outstanding syndicated credit over total bank claims on the Eurozone domestic non-financial private sector plus outstanding cross-border credit inflows is 32.6%. Using ECB data instead, we find that the ratio of total outstanding syndicated credit over the stock of loans to non-financial firms is 32.2%.

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), calculate 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 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, that is rated below investment grade.

Table 1 reports the number of borrowers by country. Out of 3594 firms with a positive demand for credit,¹⁰ 1511 firms borrow from foreign banks, and 307 firms issue foreign currency loans during our sample period.¹¹ 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

¹⁰ Of this, 1501 issue more than one loan during our sample period.

¹¹ Within a quarter, firms issue on average 2.6 loans mostly from the same syndicate and borrow on average from 4.6 banks. We do not however observe the contribution of each bank.

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 crisis 42% of US banks' loans are in US dollars against 11% before the crisis.

These observations are confirmed at the level of individual banks, comparing the lending behavior of the same bank over time. In Table 3 we list the largest foreign lenders for which we 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 crisis. 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.

2.2. 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 2007,¹² 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.

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.¹³ 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

¹² 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.

¹³ 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.

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 and most unsecured sources 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 then 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 form of funding. The surge in the demand for exchanging euros for dollars --synthetic dollar funding-- combined with limited capacity on the part of arbitrageurs¹⁴ 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), computed using 3-month Euribor, dollar Libor and forward rates.¹⁵ Central banks liquidity injections and recapitalization plans adopted starting in Q4-2009 helped restore orderly conditions in funding and credit markets until the eruption of the sovereign debt crisis.

3. Theoretical Framework

The objective of this section is to provide a framework to structure the empirical analysis. To explain the increase in foreign currency borrowing, we propose an explanation in two steps. In the first step, we consider the switch by more risky firms from Eurozone to foreign, mainly US,

¹⁴ According to Coffrey, Hrungr, and Sarkar (2009) arbitrageurs had limited capacity to shrink the basis due to the inability to raise capital quickly and/or heightened counterparty risk.

¹⁵ Interest rates and exchange rates are downloaded from Reuters.

banks. In the second step, we show that more export-oriented firms switch from Home to Foreign currency borrowing with disruptions in the Home money market and the FX swap market.

3.1. Shift to More Risky Loans by Foreign Banks

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 credit riskiness for lenders. For simplicity assume that there are two levels of credit riskiness, *Risky* and *Not Risky*, and that credit risk is not correlated to exchange rate risk. The focus is on *Risky* firms as they are dependent on bank loans, while *Not Risky* firms can find alternative sources of financing. Moreover, *Risky* firms have more impact on the riskiness of banks portfolios and are more likely to be affected by shocks to banks' capital or changes in capital regulation.¹⁶ *Risky* firms receive a proportion of N_t Home bank loans and $N_t^* = 1 - N_t$ Foreign bank loans.

We assume that a negative shock to capital has a distinct impact for Home and Foreign banks because of a different regulatory environment. Home banks are more risk averse as they are under Basel II, while Foreign banks are under Basel I.¹⁷ Home banks reduce their risk-weighted assets and thus reduce lending to *Risky* firms. This is not the case for Foreign banks, so they can substitute Home banks in lending to *Risky* firms.¹⁸ In other words, a negative capital shocks leads to a decline in N_t , and an increase in N_t^* . This can be summarized in the following hypothesis to be tested:

¹⁶ There are various mechanisms that can lead to a larger impact on more risky firms. E.g., Holmstrom and Tirole (1997), where 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.

¹⁷ The procyclical effect of Basel II capital standards has been widely discussed, both in theoretical models and in empirical analyses. E.g., see Behn et al. (2014), Kayshap and Stein (2004) or Repullo and Suarez (2012). Consequently, there is no need develop a formal model of this mechanism in this paper.

¹⁸ Besides a simple substitution effect, there may have been additional factors pushing US banks towards more risky portfolios (e.g., low interest rates or government support). See Aramonte et al. (2015), Duch and Sosyura (2014), or Landier et al. (2015).

Hypothesis 1. In the 2007-2009 credit crunch, the most risky firms switched from Eurozone to Foreign banks, especially US banks.

3.2. Shift to Foreign Currency Loans

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 advantage in borrowing in euros (dollars)¹⁹ so that in equilibrium, 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.

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 $1-\lambda_i$ in dollars. Firms

¹⁹ For example, Home firms have larger home currency deposits and easier access to Home central bank liquidity.

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 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:

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

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 (as $\Pi_i^E < \Pi_i^{DH}$). 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 to *Risky* firms as $D = D(i^E, i^D, \Delta)$, where D increases with i^E and Δ and decreases with i^D . This leads to the following testable hypothesis:

Hypothesis 2. When host country interbank markets or the FX swap market dry up, more export-oriented firms increasingly borrow in dollars

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

A significant increase in foreign currency borrowing D by *Risky* firms can therefore be explained by a combination of two shocks. First, the reduction in banks capital at the onset of the financial crisis leads to a Home credit crunch. This increases the market share N_t^* of Foreign banks, so that *Risky* firms switch from Home to Foreign banks with a higher appetite for risk. Second, the drying up of liquidity in euro wholesale markets leads Foreign banks to shift to Foreign currency as they have low deposits in domestic currency. Moreover, 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.

We therefore test this explanation by testing Hypotheses 1 and 2. First, we examine 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 disruption in 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).

4.1 The Shift to Foreign Banks

We test Hypothesis 1, i.e., the cyclicity of foreign credit, using the following baseline regression:

$$(1) \quad y_{ijt}^1 = c^1 + \theta_i^1 + \gamma_t^1 + \beta_1 CCI_{jt} + \beta_2 CCI_{jt} * Risky_{it} + \beta_3 Risky_{it} + X_{jt}\beta_4 + \varepsilon_{ijt}$$

The left-hand side variable is either a dummy that takes value 100 if firm i headquartered in country j borrows from a foreign bank²⁰ or the percentage of foreign banks in the syndicate. θ_i^1 are firm fixed effects and γ_t^1 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 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

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).

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.

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 for riskier firms we should verify that $\beta_1 + \beta_2 > 0$.

The results of estimating equation (1) are reported in Table 4. Reported standard errors are clustered at country*year level.²⁴ In column I the dependent variable is the dummy for borrowing from a foreign bank rather than a domestic bank. The estimate of $\beta_1 + \beta_2$ 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 $\beta_1 + \beta_2$ 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. By focusing on real investment loans we address the concern that lending declined also because of a

²⁴ We have followed Cameron and Miller (2013) in deciding at what level to cluster the standard errors. They recommend using “a conservative approach to avoid bias and use bigger and more aggregate clusters when possible, up to and including the point at which there is concern about having too few clusters”. We tried also clustering by country only and the results are unchanged.

decline in the demand for restructuring loans. Indeed, firms scale back on expansion plans during a recession.

In terms 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 which captures the effect on not risky firms instead is small and statistically insignificant meaning that on average US banks increase risk 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.

In columns VI and VII we analyze whether the estimates differ between firms that are likely to receive high foreign currency revenues and other firms. We use sector level export intensity (export sales over total sales) as a proxy for foreign currency earnings. A better approach would have been to focus on extra-European export intensity since intra-European exports are more likely to be denominated in Euro but these data are not available. 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.²⁵ For non-US foreign loans the estimate is either negative or insignificant, column VII.

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 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

²⁵ *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.

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 Hypothesis 1 is consistent with the data, so that foreign banks somewhat contribute 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

Before testing Hypothesis 2, 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, we suppose that 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 shift would allow keeping currency risk and the associated capital requirement low.

We confirm this conjecture in column I. An increase in CCI from the 10th percentile to the 90th 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.

We then turn to test Hypothesis 2, which amounts to test that $D = D(i^E, i^D, \Delta)$. We consider the following specification which we run on the sample of quarters when domestic banks tighten credit standards ($CCI > 0$):

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

where y_{ijt}^2 is the percentage of debt issued in foreign currency. 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 .²⁶ As predicted by our model, we find that an increase in the euribor-ois spread (ERP) amplifies the shift to foreign currency during the crisis. 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

²⁶ If we estimate equation (2) on the full sample or the quarters when $CCI \leq 0$ 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.

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 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.

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 somewhat 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 of the borrower. 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.²⁷ This effect is larger for riskier borrowers.

4.3 Robustness Checks

We ran several additional robustness checks. First, we ran weighted least squares based on loan size and obtained similar results with often larger point estimates. This means that our results are not driven by a higher number of small value loans but hold also for large and very large loans.

Second, 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 database²⁸ and Amadeus Bureau van Dijk²⁹ 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.

²⁷ 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.

²⁸ Available at <https://www.bach.banque-france.fr/>

²⁹ Although these data are available at firm level we used country-sector averages because of the very imperfect matching between SDC platinum and Amadeus.

We also analysed the shift from bank to bond finance and found that for risky firms bond finance³⁰ is procyclical while for investment grade firms it is countercyclical. Investment grade 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 third 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.

Fourth, 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 *Risky* 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.

³⁰ 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.

All in all, we find that a twin crisis in the credit market and in funding markets explains the dramatic shift from euro credit to dollar credit observed for 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 an analysis of the mitigating effect of foreign banking measured by the percentage of foreign banks in the last pre-crisis loan syndicate. To address the possible endogeneity of foreign banking, we apply an instrumental variables approach using as instruments the propensity of the last pre-crisis loan arranger(s) to co-syndicate with foreign banks. We report first-stage F-statistics and over-identification test statistics that validate our instruments. We also report standard tests of weak instrumental variables which support the hypothesis that the instruments we use are strong predictors of foreign banking.

The baseline regression for the change in employment E reads:

$$(3) \quad \Delta E_{ij} = \delta_j + \theta_s + \mu_2 \text{Risky}_i * \text{Weak bank}_i + \mu_3 \text{Risky}_i + \mu_4 \text{Weak bank}_i + \mu_5 \text{Risky}_i \\ * \text{Weak bank}_i * \% \text{foreign bank}_i + \mu_6 \text{Weak bank}_i * \% \text{foreign bank}_i \\ + \mu_7 \text{Risky}_i * \% \text{foreign bank}_i + X_i * \mu_8 + \varepsilon_{ij}$$

where δ_j and θ_s are country and industry fixed effects. $\text{Risky}_i * \text{Weak bank}_i$ captures the exposure of firm i to the credit crunch: it is the interaction between the firm credit quality (risky or not risky) in 2007 and a dummy for having a pre-crisis relationship with a weak bank based on the last pre-crisis syndicate. We define a weak bank as a bank that filed for bankruptcy, was forced into merger, nationalized, or recapitalized with public funds between 2007 and 2010. 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).

To study the mitigating role of foreign banking we augment equation (3) with a triple interaction $\text{Risky}_i * \text{Weak bank}_i * \% \text{foreign bank}_i$ where $\% \text{foreign bank}_i$ is the percentage of foreign banks in the last pre-crisis loan syndicate.³¹ This triple and double interaction terms are then instrumented by the interactions of Risky_i , Weak bank_i and $\text{Risky}_i * \text{Weak bank}_i$ with the average sample propensities of the last pre-crisis loan arranger(s) to co-syndicate with US banks and with other foreign banks. We have therefore more instruments than endogenous variables.

³¹ Our results are unchanged if instead we use the average percentage of foreign banks in the 5 years preceding the crisis.

To estimate regressions (3) we hand-matched the Dealscan with the Bureau van Dijk 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 450 firms.. We cover 12 Eurozone countries and 23 sectors. Of these 450 firms 25% issue risky debt, and 288 firms have 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 40 percent lower probability of obtaining a loan during the crisis. This falls to a 10 percent lower probability of obtaining a loan when the endogeneity of foreign banking is addressed. Foreign banking does not have mitigating effect at the extensive margin whether the equation is estimated by probit (column I) or ivprobit (column II). In column II we report a first-stage F-statistic of excluded instruments above 10 and the Hansen J-statistic cannot reject exogeneity of our instruments. Furthermore, the Wald F statistic is above the Stock-Yogo critical value. This conclusion is unchanged in column III where we add double interactions.

At the intensive margin, however, foreign banking matters. In column IV conditional on obtaining a loan, foreign banks participate more when domestic bank relationships are weak. In columns V and VI both OLS and 2SLS estimates with the spread over pre-crisis borrowing cost as dependent variable (excluding variations above 400 basis points) confirm that relationships with foreign banks mitigate the effect of the domestic credit crunch at the intensive margin: the 2SLS estimate means that fully foreign banked firms pre-crisis experience an increase in their borrowing cost 132 basis points lower. This effect increases to 169 basis points if we add double interactions (342-511, column VII).

We now turn to the results of estimating equation (3) reported in Table 10. We assess the mitigating role of foreign banks using a triple interaction of $Risky_i * Weak\ bank_i$ with the percentage of foreign banks. A positive coefficient on the triple interaction $Risky_i * Weak\ bank_i * \% \text{ foreign bank}$ confirms that the effect of the credit crunch on employment is lower for firms that rely more on foreign banks before the crisis. The OLS (column I) and 2SLS (column 2) estimates are very close, and the point estimates are larger if we use a fully saturated model in columns III and IV. Again we report a first-stage F-statistic above 10 and the Hansen J-statistic and Wald F statistic cannot reject exogeneity of our instruments.

Fully foreign banked exposed firms do not reduce employment while exposed firms fully reliant on domestic banks reduce employment by up 32 %. 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.

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 a set of factors 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 other factors also 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 is therefore consistent with the view that 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 rates. 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.

Acknowledgments

We would like to thank two anonymous referees, Linda Goldberg, Steven Ongena, and Clemens Otto, as well as seminar participants at the New York Fed, the IMF, the World Bank, the Swiss National Bank, the University of Lausanne, University of Geneva, University Paris Dauphine, Aix-Marseille School of Economics, University of Zurich, 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.

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.

Aramonte, S., S. J. Lee, and V. Stebunovs (2015). Risk Taking and Low Longer-term Interest Rates: Evidence from the U.S. Syndicated Loan Market. Finance and Economics Discussion Series 2015-068, Board of Governors of the Federal Reserve System.

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

Behn, M., R. Haselmann and P. Wachtel (2014). Pro-cyclical Capital Regulation and Lending. Deutsche Bundesbank Discussion Paper No 32/2014.

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). Bank Funding, Securitization, and Loan Terms: Evidence from Foreign Currency Lending, Journal of Money, Credit and Banking, 46, 1313-1554.

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 (2014). The Real Effect of Foreign Banks. *Review of Finance* 18, 1683-1716.

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.

Cameron C.A. and D. Miller (2013). A Practitioner's Guide to Cluster-Robust Inference. *Journal of Human Resources*, 50: 317:372

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. Hrungr, 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. (2015). Dollar Funding and the Lending Behavior of Global Banks. *Quarterly Journal of Economics* 130, 1241–1281.

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.

Kashyap A. K and J. C. Stein (2004). Cyclical Implications of the Basel II Capital Standards. Federal Reserve Bank of Chicago, *Economic Perspectives* 1Q/2004.

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

Landier, A., D. Sraer, and D. Thesmar (2015). The Risk-Shifting Hypothesis: Evidence from Subprime Originations. mimeo.

Mariathanan 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.

Repullo, R. and J. Suarez (2012). The Procyclical Effects of Bank Capital Regulation. *Review of Financial Studies* 26 (2), 452-490.

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

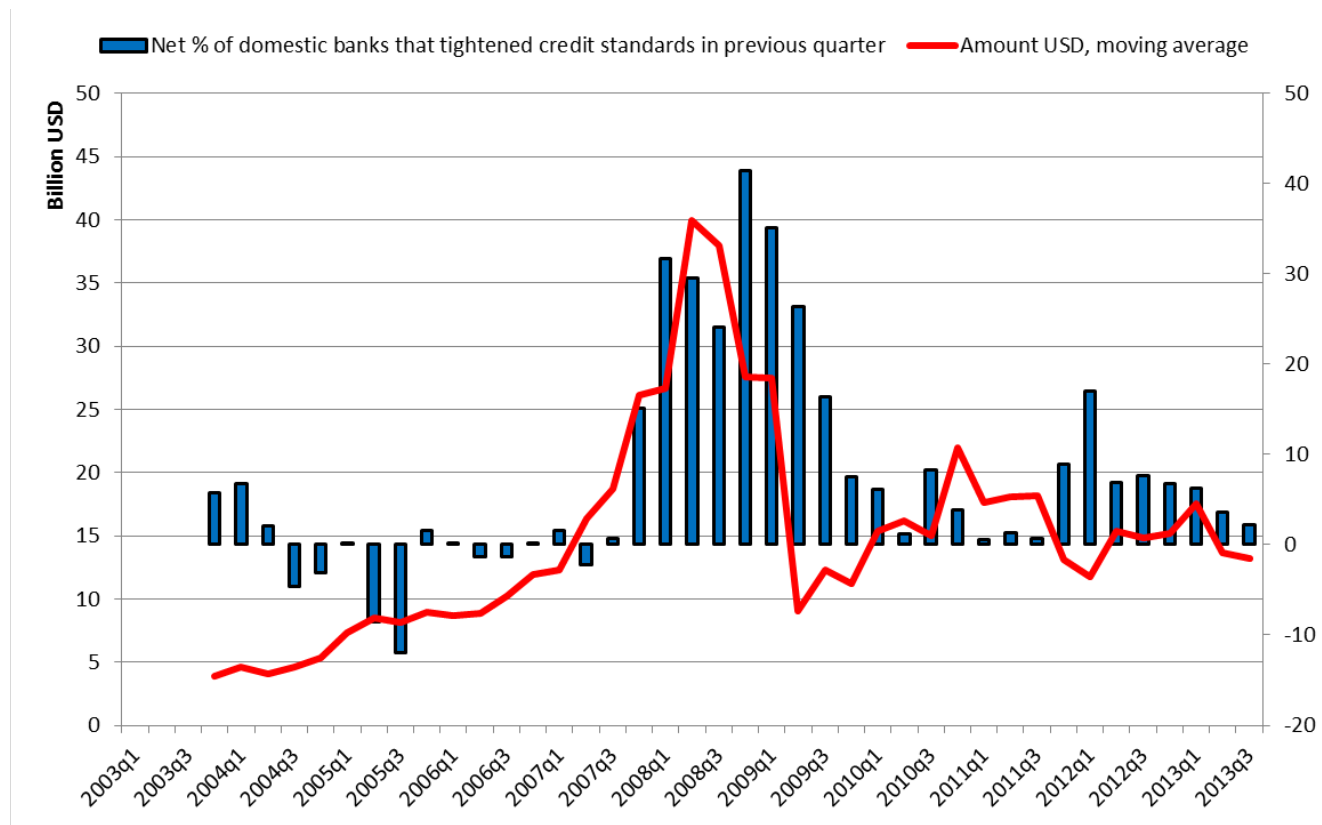


Figure 2. Percentage of syndicated loan issuance denominated in US dollars by borrower risk type

Risky borrowers are rated below investment grade. The sample includes all non-financial Eurozone borrowers.

Source: Thomson-Reuters Dealscan, authors' calculations

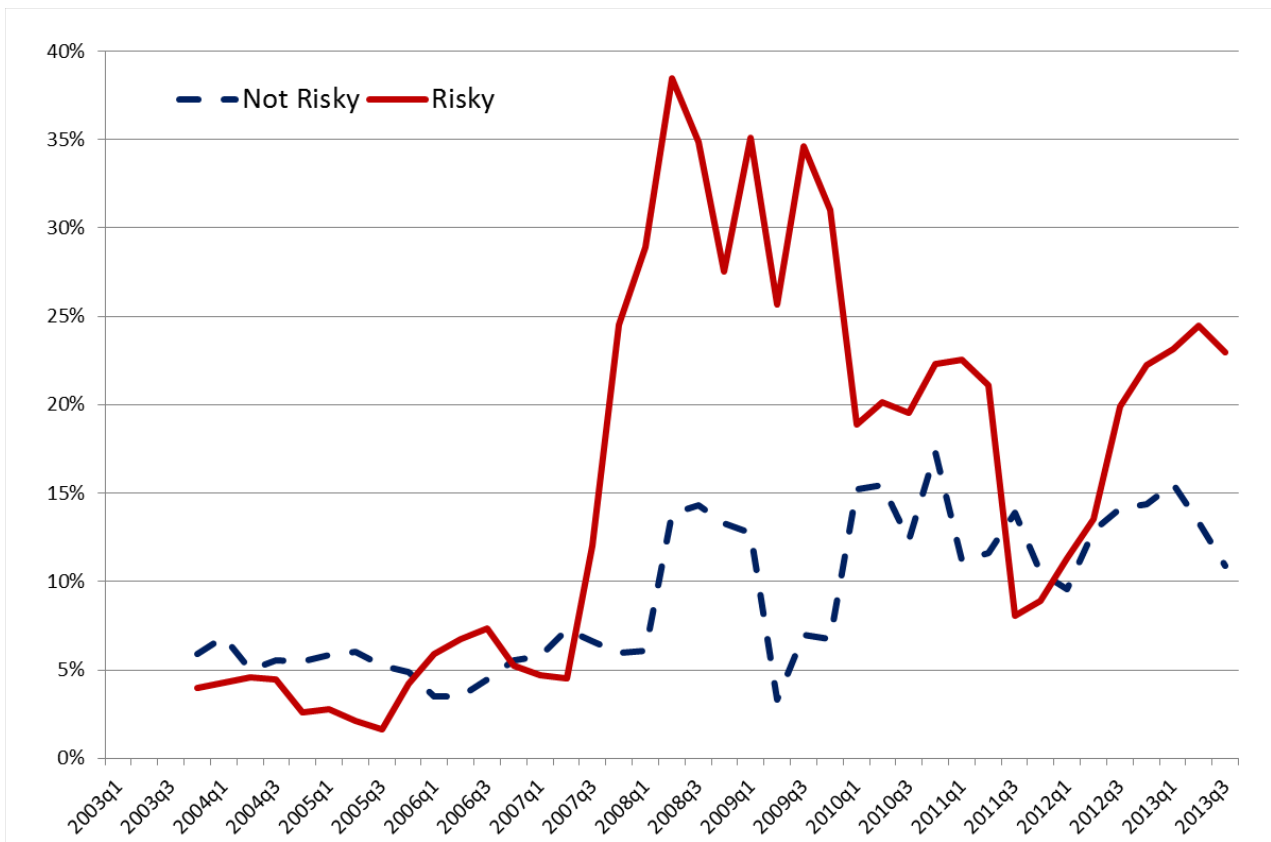


Figure 3. Stress in the interbank market

Source: Datastream

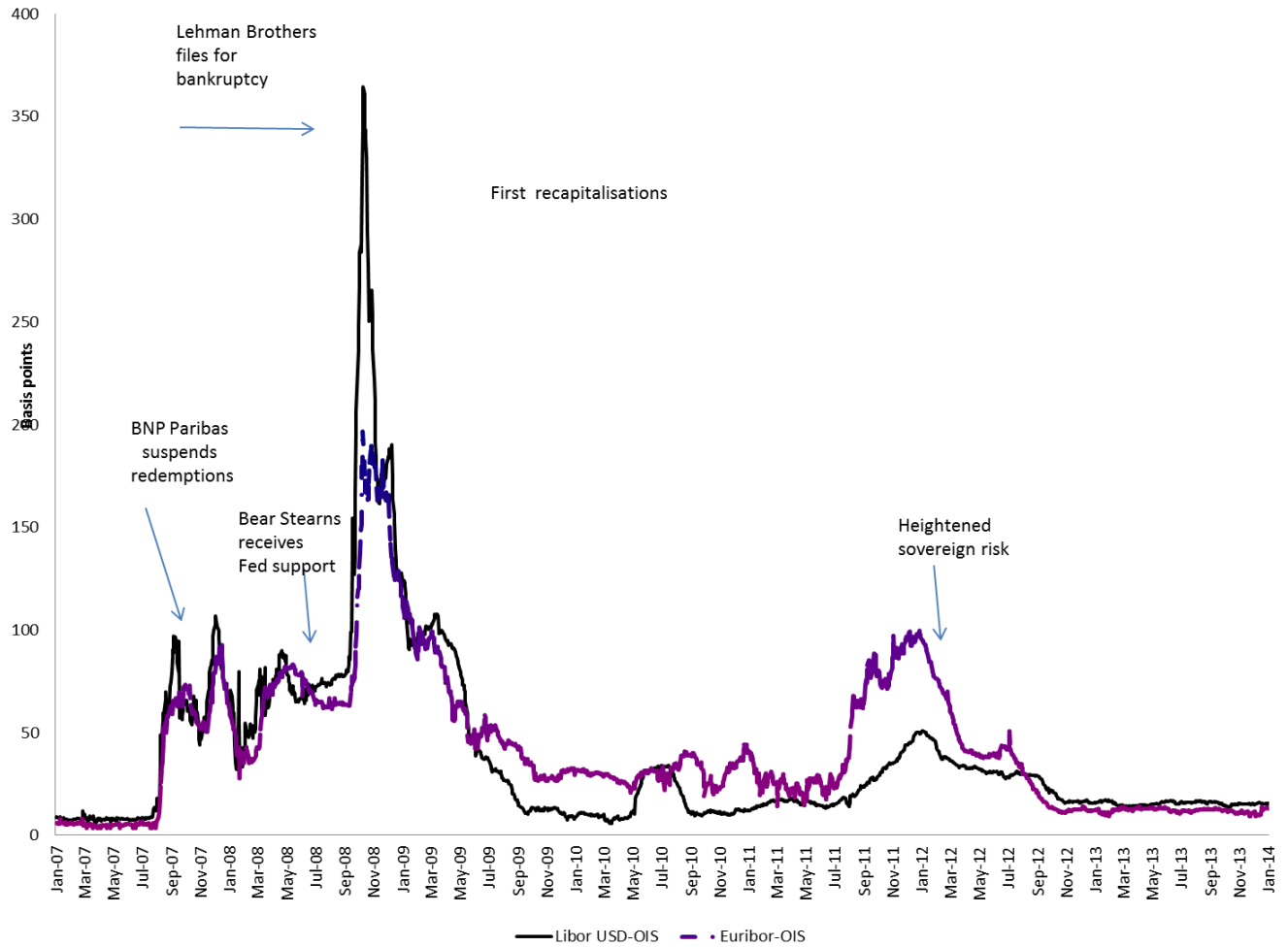


Figure 4. Deviation from covered interest parity measured by the Euro basis (basis points).

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.

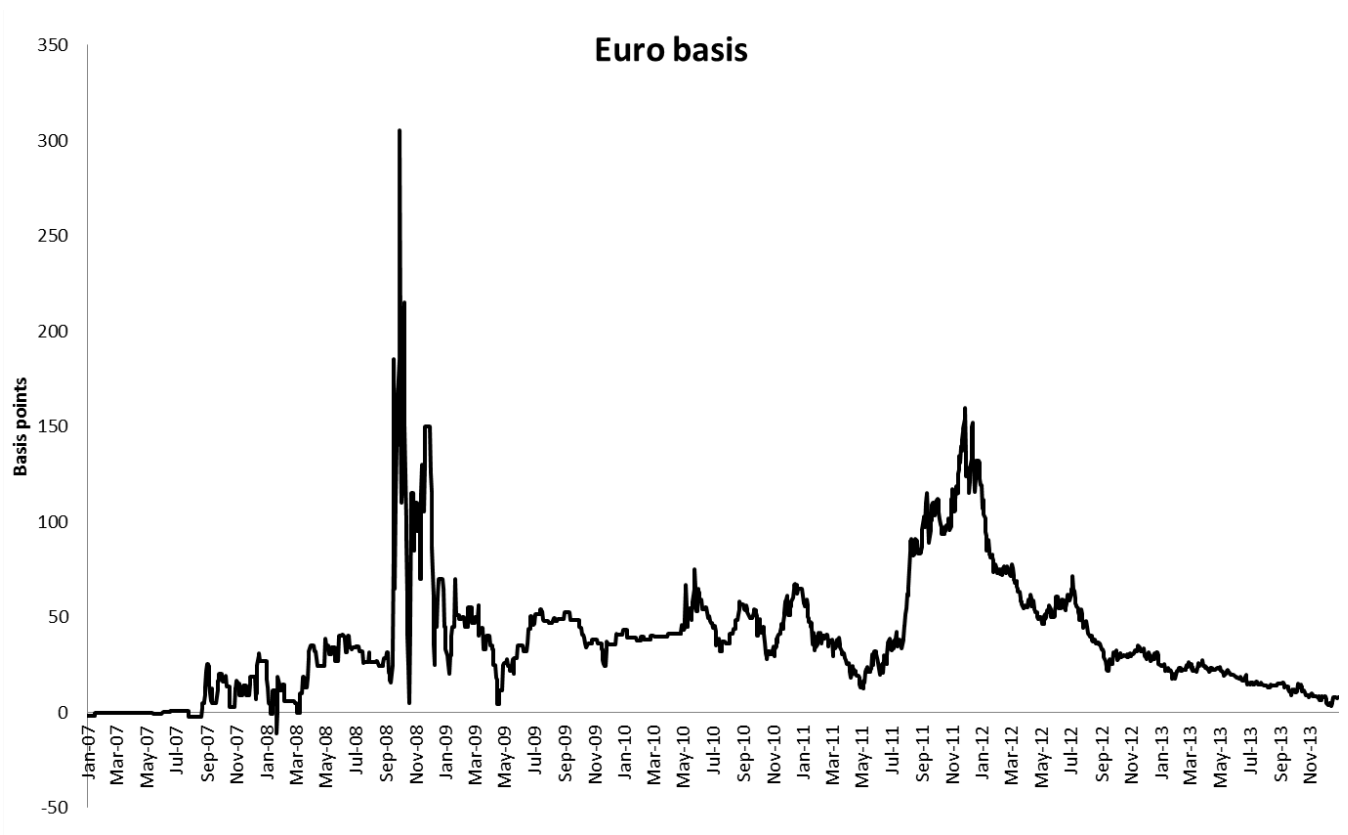


Table 1. Sample composition by country

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
<i>Belgium</i>	90	44	10
<i>Finland</i>	70	66	2
France	856	337	59
Germany	622	270	56
<i>Greece</i>	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%
Japanese banks	3%	1%	3%	8%
Other banks	12%	15%	12%	8%
All foreign banks	41%	<u>49%</u>	40%	10%
Eurozone banks	59%	<u>51%</u>	60%	7%

**Q3-
2007/Q4-
2009**

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

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

This table 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
<u>UK and Swiss banks</u>				
Barclays	25%	11%	22%	20%
Lloyds	46%	9%	31%	22%
Royal Bank of Scotland	40%	11%	35%	24%
Crédit Suisse	45%	9%	47%	41%
<u>US banks</u>				
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%
<u>Japanese banks</u>				
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. *CCI* is the net percentage of Eurozone banks that tightened lending standards to large firms in the previous 3 months. $I(\cdot)$ 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.

	I	II	III	IV	V	VI	VII
			Real purpose loans	Excludes non-US foreign loans	Excludes US loans	Excludes non-US foreign loans	Excludes US loans
Risky	-6.473 (5.772)	-2.115 (2.905)	-7.679 (6.026)	-0.201 (3.526)	-6.796 (3.081)**	-0.150 (3.537)	-6.349 (3.095)**
I(CCI>0)	-6.698 (2.034)***					0.003 (0.054)	
I(CCI>0)*Risky	14.984 (4.100)***						
CCI		-0.069 (0.043)	-0.027 (0.112)	0.002 (0.054)	-0.124 (0.053)**		-0.135 (0.052)**
CCI*Risky		0.106 (0.094)	0.523 (0.151)***	0.184 (0.086)**	0.028 (0.107)		
CCI*Risky*High Export						0.222 (0.075)***	-0.087 (0.132)
CCI*Risky*Low Export						0.139 (0.126)	0.178 (0.109)
R^2	0.04	0.03	0.12	0.06	0.04	0.06	0.04
N	4,466	4,466	1,529	3,236	3,761	3,236	3,761

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

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 (0.842)	3.626 (0.936)***
CCI	0.020 (0.009)**	0.027 (0.012)**
CCI*Risky	0.043 (0.027)	0.089 (0.034)**
R^2	0.08	0.45
N	1556	1860

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

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 and the 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 (4.879)	1.896 (4.972)	2.825 (1.958)	2.803 (1.963)
CCI	-0.142 (0.189)	-0.144 (0.190)	-0.005 (0.074)	-0.002 (0.073)
CCI*Risky	0.480 (0.198)**		0.011 (0.071)	
CCI*Risky*High Export		0.587 (0.179)***		0.056 (0.095)
CCI*Risky*Low Export		0.411 (0.300)		-0.033 (0.096)
R^2	0.11	0.11	0.02	0.02
N	705	705	4466	4466

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

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. Standard errors are heteroskedasticity-robust and clustered by country*year.

	I	II	III
Risky	3.286 (2.397)	4.991 (2.547)*	6.639 (3.137)**
ERP*Risky	33.980 (12.565)***	18.581 (6.287)***	
DRP*Risky	-15.536 (6.030)**	-18.667 (7.510)**	
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
N	2270	2270	2270

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

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 (0.997)	0.045 (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 (1.023)	0.325 (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	1047	1047

Table 9. Mitigating role of foreign banks I

The dependent variable in column I is a dummy that indicates whether the firm has been able to borrow during the period Q3-2007 to Q4-2009 (the crisis period). In column II the dependent variable is the average % of foreign banks in loans issues during the period Q3-2007 to Q4-2009. In columns III to IV it is the average all-in-drawn spread to benchmark during Q3-2007 to Q4-2009 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. *%Foreign bank* is the percentage of foreign lead banks in the last pre-crisis syndicate. 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 matures during the crisis. Standard errors are heteroskedasticity-robust and clustered by country. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.001$

	I	II	III	IV	V	VI	VII
	Access	Access	Access	% Foreign bank	Spread	Spread	Spread
	PROBIT	IVPROBIT	IVPROBIT	OLS	OLS	2SLS	2SLS
Risky	0.247 (0.150)	0.059 (0.031)*	-0.021 (0.301)	0.010 (0.051)	13.340 (33.517)	12.043 (30.314)	-33.276 (40.147)
Weak bank	-0.024 (0.212)	0.002 (0.048)	0.229 (0.155)	-0.008 (0.020)	0.135 (29.167)	-0.652 (26.569)	-3.540 (34.083)
Risky*Weak bank	-0.404 (0.132)***	-0.105 (0.041)**	-0.379 (0.355)	0.103 (0.035)**	-5.645 (37.919)	8.444 (37.978)	63.304 (54.090)
Risky*%Foreign bank			0.882 (0.792)				342.264 (137.410)**
Weak bank*%Foreign bank			-1.303 (0.637)**				34.815 (158.943)
Risky*Weak bank*% Foreign bank	-0.129 (0.204)	-0.007 (0.082)	0.402 (1.081)		-88.395 (49.652)*	-132.606 (76.208)*	-511.728 (177.134)***
<i>First-stage F-statistic</i>		26.65	22.71			275.88	24.43
<i>Wald F statistics</i>		11.90	36.44			275	7.68
<i>Stock-Yogo critical value</i>		7.77	12.20			19.9	5.35
<i>J-statistic p-value</i>		0.23	0.39			0.08	0.18
N	1806	1806	1806	390	309	309	309
R2				0.39	0.20		

Table 10. Mitigating role of foreign banks II

The dependent variable is the growth rate of employment 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. We include 2-digit SIC code fixed effects, log total assets, log firm 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). In column II and we instrument *% foreign bank* by the propensities of the last pre-crisis loan arranger(s) to co-syndicate with US, UK, Japanese, and other foreign banks during 2004-2013. Errors are clustered by country. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

	I	II	III	IV
	OLS	2SLS	OLS	2SLS
Risky	0.059 (0.066)	0.065 (0.062)	0.116 (0.063)*	0.151 (0.104)
Weak bank	-0.003 (0.031)	-0.003 (0.029)	0.010 (0.029)	0.022 (0.024)
Risky*Weak bank	-0.204 (0.056)***	-0.236 (0.055)***	-0.260 (0.052)***	-0.343 (0.083)***
Risky*% Foreign bank			0.009 (0.096)	-0.065 (0.198)
Weak bank*% Foreign bank			-0.158 (0.087)*	-0.272 (0.176)
Risky*Weak bank*% Foreign bank	0.195 (0.031)***	0.319 (0.066)***	0.321 (0.148)*	0.668 (0.230)***
<i>First-stage F-statistic</i>		15.92		9
<i>Wald F statistics</i>		73.82		11.54
<i>Stock-Yogo critical value</i>		19.93		7.77
<i>J-statistic p-value</i>		0.39		0.20
R^2	0.17		0.12	
N	450	450	450	450