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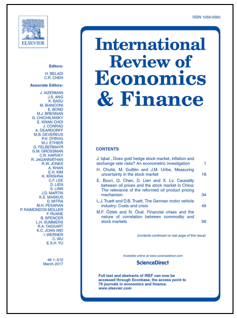

Trade credit, sovereign risk and monetary policy in Europe

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TRADE CREDIT, SOVEREIGN RISK AND MONETARY POLICY IN EUROPE

ABSTRACT

The purpose of this article is to analyze how sovereign risk influences the use of trade credit, both directly and through monetary policy. In addition, we test whether these effects differ during the crisis as compared to before the crisis. Using a sample of 45,864 Eurozone firms (2005–2012), we find that trade credit received increases when sovereign risk becomes higher, but only before the crisis. However, during the crisis, trade credit supply decreases as sovereign risk increases. Additionally, monetary restrictions only lead to an increase in trade credit in low or moderate sovereign risk countries.

Keywords: Trade credit; Sovereign risk; Monetary policy.

JEL Classification: E44, E52, G32.

1. INTRODUCTION

Monetary policy exerts its influence through several channels, which include the interest rate effects, exchange rate effects, other asset price effects, and the credit channel (Mishkin, 1995). The credit channel includes a mechanism called the trade credit channel, which highlights the importance of trade credit as an alternative source of funding. According to this channel, when monetary policy tightens and funding from financial institutions declines, firms increase their use of trade credit (Meltzer, 1960; Kohler et al., 2000; Nilsen, 2002; Mateut et al., 2006). In this context, the less financially vulnerable firms canalize sources of funding by extending trade credit to firms rationed by financial intermediaries. Thus, trade credit can be an important source of finance when there is shortage of bank credit, in that it helps in alleviating the financial constraints on firms.

Since the onset of the financial crisis, there has been a growing concern for the impact of sovereign risk on financial intermediaries, their balance sheets, and their ability to grant credit. Greater sovereign risk increases the cost and reduces the availability of some euro area bank funding, which leads to a sharp reduction in the supply of bank loans (CGFS, 2011; Bofondi et al., 2013; Albertazzi et al., 2014;

Cantero-Saiz, et al., 2014). This reduction in bank lending forces firms to look for alternative sources of finance, and trade credit is one of them. However, greater sovereign risk imposes severe financial restrictions on firms, increases the credit risk of firms and makes them maintain more precautionary liquidity, thus reducing their ability to extend and receive trade credit and leading to asymmetries in the monetary policy transmission mechanism (Acharya et al., 2013; Broner et al., 2014). The analysis of this topic has important implications for the governments of each country, who need to take actions to mitigate the adverse effects of sovereign risk on national firms. Besides, it is useful for the European Central Bank, since the current context suggests that the single monetary policy, which has been in existence in Europe since 1999, is not affecting all the countries equally. Thus, it is necessary to understand how sovereign risk differences across countries determine the effects of monetary policy on trade credit.

However, despite the far-reaching repercussions of this reality, not much research has been done on this issue, especially in Europe. This is because sovereign risk was not a major concern in the Eurozone until 2010, when the financial crisis was further aggravated following the onset of the sovereign debt crisis. Thus, the influence of sovereign risk on firms' funding conditions and monetary policy transmission is a recent issue in Europe that requires special attention. Although several papers have analyzed the effects of monetary policy decisions on the use of trade credit[1], they do not consider how these effects can be conditioned by the existence of sovereign risk. This fact explains why the main purpose of this article is to analyze how sovereign risk affects trade credit, both directly and through monetary policy.

The sample for our empirical analysis comprises 45,864 firms from twelve Eurozone countries (the original eleven countries plus Greece) over the period 2005–2012. The selection of these countries allows for analysis of the effects of sovereign risk on the trade credit channel, avoiding the bias caused by different monetary policies.

The analysis was performed using the System-GMM methodology for panel data. This methodology allows for controlling both unobservable heterogeneity and the problems of endogeneity between trade credit and the characteristics of firms through the use of instruments. In addition, this methodology yields consistent and unbiased

[1] See, among others, Nadiri (1969); Nilsen (2002); Atanasova and Wilson (2003); Guariglia and Mateut (2006); Mateut et al. (2006) and Gama et al. (2014).

estimates of the relationships between the macroeconomic variables, firm-specific characteristics and trade credit.

We analyzed trade credit from a double perspective. On one hand, we examined trade credit that firms receive from suppliers and, on the other hand, we studied trade credit that firms extend to customers. Our results reveal that trade credit received increases with the level of sovereign risk, but only before the crisis. However, during the crisis there is no evidence that greater sovereign risk increases trade credit received. In the years prior to the crisis, good financial conditions and low sovereign risk enabled firms to increase their access to trade credit. Nevertheless, after the onset of the crisis, sovereign risk and the probability of default of firms in the most affected countries sharply increased. This rendered suppliers reluctant to provide trade credit to those firms, and that explains why trade credit received cannot increase with the level of sovereign risk during the crisis.

Concerning trade credit extended, it declines during the crisis as sovereign risk rises. Greater sovereign risk seriously affects the financial conditions of firms and makes them increase their precautionary liquidity, which is why they reduce the level of trade credit they provide to their customers.

Additionally, a restrictive monetary policy only leads to an increase in trade credit in countries with low or moderate sovereign risk. In high sovereign risk countries, greater funding difficulties, high firms' probability of default and credit contagion effects may outweigh the positive impact of monetary contractions on trade credit.

Consequently, the results of this article provide three contributions to the existing literature. First, we determine how different levels of sovereign risk affect the use of trade credit by non-financial firms. Second, we test whether the effects of sovereign risk on trade credit differ during the crisis, as compared to those during the non-crisis years. Third, we show how sovereign risk determines the effects of monetary policy on trade credit through the trade credit channel.

The remainder of the article is structured as follows: Section 2 reviews the previous literature; Section 3 focuses on empirical analysis and discussion of the results; and Section 4 presents the conclusions.

2. LITERATURE REVIEW

2.1. Reasons that justify the existence of trade credit

Trade credit is a short-term loan that a supplier provides to a customer in the form of delayed payment for their purchases and represents an important proportion of external funding for firms (Cuñat-Martinez and Garcia-Appendini, 2012)[2]. One essential aspect of trade credit is its two-way nature. Most firms, especially those at the intermediate point in the value chain, obtain trade credit from their suppliers and extend it to their customers. In consequence, trade credit represents an important component of both corporate liabilities and assets.

There are several reasons that explain why some firms extend credit to their customers and receive credit from their suppliers. These reasons can be divided into two groups: the *transaction motives* and the *financing motives* (Mateut, 2005).

The *transaction motives* consider trade credit as a part of firms' operation cycle and justify its existence for several reasons. First, trade credit reduces transaction costs by making payments less frequent (Ferris, 1981), simplifying cash management for customers (Schwartz, 1974) and allowing suppliers to manage their inventory positions better (Emery, 1984; Long et al., 1993). Second, trade credit can also reduce the information asymmetries between the supplier and the customer by providing a quality guarantee. On one hand, suppliers can attest to the quality of their products by extending trade credit, so that the buyer can verify the quality of the product before payment (Long et al., 1993). On the other hand, specific terms such as early payment discounts can enable customers to reveal their credit quality through their payment practices (Smith, 1987). Third, trade credit allows for price discrimination between low-quality and high-quality customers. In this regard, when anti-trust laws forbid direct price discrimination, high-priced trade credit can be a protection from low-quality customers, who will accept these trade credit conditions as they have no other financing alternatives (Brennan et al., 1988; Petersen and Rajan, 1997). Fourth, trade credit contributes toward guaranteeing the survival and the loyalty of customers because, although suppliers do not favor risky clients, they consider the benefits of maintaining

[2] Trade credit represents more than 25% of total corporate assets in several European countries (Kohler et al., 2000; Guariglia and Mateut, 2006).

long-term relationships with clients in deciding to extend trade credit (Smith, 1987; Wilner, 2000).

The *financing motives* postulate that suppliers have a financing advantage over other lenders in providing credit to their customers because of various reasons (Petersen and Rajan, 1997; Ng et al., 1999; Mateut, 2005). First, the monitoring costs of the suppliers may be low, because they can acquire information about the creditworthiness of a buyer during the normal course of the commercial relationship. Second, the supplier may be in a better position to enforce repayment by threatening to cut off future supplies, especially if the buyer has few alternative sources for goods. Third, the supplier may be in a better position to repossess and resell the supplied goods. Finally, the suppliers may have superior knowledge of the market, so that they can better distinguish between a buyer in financial trouble and a market in decline.

2.2. The trade credit channel of monetary policy

The importance of trade credit as a source of finance has formed the foundation for the monetary policy transmission mechanism, called the trade credit channel. This channel postulates that, during monetary restrictions, firms increase their use of trade credit to offset the contraction in lending by financial intermediaries. In this context, the firms with better access to bank funding and capital markets, and hence being less vulnerable to monetary shocks, redistribute their finance by extending trade credit to more vulnerable firms (Meltzer, 1960). Thus, trade credit is a substitute source of funding for bank loans when credit institutions curtail lending.

Trade credit is considered more expensive than bank credit, especially when customers do not use the early payment discount (Petersen and Rajan, 1997)[3], which is why trade credit is a less desirable alternative to corporate finance coming behind bank credit in the financing *pecking order* (Myers and Majluf, 1984). Even so, the trade credit channel assumes that its cost is relatively more stable over time (Ng et al., 1999). Thus, when monetary restrictions curtail bank lending, and the effective cost of bank finance increases, trade credit becomes relatively cheaper for some firms, and may even be their only source of funding available. As a result, credit rationed firms resort to trade credit to offset the decline in bank lending and the higher costs involved in

[3] Cuñat-Martinez (2007) considers that trade credit is costlier, even if there are no early payment discounts, because suppliers get a premium for providing credit when banks are not willing to lend.

accessing it. In contrast, when monetary policy is expansionary, the cost of bank finance remains lower than the cost of trade credit, and hence firms prefer to use bank loans, instead of trade credit, for finance (see Figure 1).

[Insert Figure 1]

Several studies confirm this relationship between trade credit and bank loans. Nadiri (1969) finds that trade credits extended and received increase during monetary contractions in the United States (US), while net trade credit (the difference between trade credits extended and received) does not vary. Schwartz (1974) also shows that monetary restrictions in the US increase the use of trade credit, mainly for small firms, while large firms tend to grant more trade credit. However, Nilsen (2002) reports that firm size does not influence the use of trade credit when there is restrictive monetary policy. Only American firms with bond rating are able to access bank funding and capital markets during monetary shocks, thus avoiding the more expensive trade credit financing.

As far as the empirical evidence in Europe is concerned, Mateut and Mizen (2002) show that monetary restrictions in the United Kingdom lead to a reduction in bank loans and to an increase in the use of trade credit, especially for small, young and risky firms. Mateut et al. (2006) report similar results, but also they find that monetary expansions produce an increase in bank lending and a reduction in trade credit[4]. In addition, Valderrama (2003) shows that the use of trade credit as an alternative source of funding to bank loans mitigates the impact of monetary shocks in Austria. More recently, Gama et al. (2014) show that small and medium-sized firms in Portugal use more trade credit to overcome their difficulties in accessing bank loans[5].

2.3. Trade credit and sovereign risk

The financial crisis that erupted in 2008 caused a sharp deterioration in the public finances of several European countries, raising investor concerns about sovereign risk. Greater sovereign risk had a serious impact on financial intermediaries, which worsened

[4] Other studies also find that monetary contractions push up the use of trade credit in the United Kingdom (Kohler et al., 2000; Atanasova and Wilson, 2003; Guariglia and Mateut, 2006).

[5] Although trade credit is an alternative source of finance to bank lending, it may also help credit-constrained firms to access loans because suppliers have private information on their customers that they can pass on to bank lenders (Biais and Gollier, 1997; Burkart and Ellingsen, 2004; Agostino and Trivieri, 2014).

their financing conditions through several mechanisms (CGFS, 2011). First, the increase in sovereign risk reduced the value of banks' holdings of sovereign debt, which damaged their balance sheets and thus restricted their access to funding. Second, greater sovereign risk decreased the value of the collateral that banks can use to obtain funding in the wholesale markets. Third, sovereign rating downgrades were followed by downgrades in the domestic bank ratings, which resulted in increasing their risk and making funding more difficult and expensive. Fourth, sovereign risk deterioration decreased the benefits that systemic banks obtain from government guarantees, and thus increased their financing costs. These funding problems for banks in high sovereign risk countries restricted the supply and increased the cost of bank credit[6].

This reduction in lending has important implications, since bank credit is the main source of external funding for the non-financial private sector in the Eurozone. Thus, the impact of sovereign risk on banks will also significantly affect the financing conditions of firms. In this context, the reduction in bank loans and their increased cost force firms to resort to trade credit as an alternative source of funding (Santos et al., 2012; Coulibaly et al., 2013; Casey and O´Toole, 2014; Carbó-Valverde et al., 2016). However, the effectiveness of trade credit as a substitute for bank loans can be reduced in periods of strong global crises and credit crunch problems, since all firms suffer severe financial restrictions that impede the redistribution of resources through trade credit to offset the reduction in bank loans (Love et al., 2007; Love and Zaidi, 2010; Kestens et al., 2012; Psillaki and Eleftheriou, 2015; Lin and Chou, 2015). In this regard, several reasons can explain why trade credit cannot be an effective substitute for bank credit in countries with high sovereign risk.

First, apart from bank markets, sovereign risk has also led to disruption in other sources of funding, such as the capital markets. Yields on government bonds usually act as a benchmark for bonds issued by firms. Thus, high yields in government bonds, due to high sovereign risk, will sharply increase the cost of corporate bonds (Fostel and Kaminsky, 2007; Cavallo and Valenzuela, 2010; Diaz et al., 2013; Pianeselli and Zaghini, 2014). In this context, traditional trade credit suppliers will have more difficulties in canalizing sources of funding to their customers.

[6] Several empirical studies have found that sovereign risk has reduced loan supply by increasing the funding costs of banks (Bofondi et al., 2013; Albertazzi et al., 2014; Cantero-Saiz, et al., 2014).

Second, greater sovereign risk, due to rising public debt, also implies higher financing needs for the public sector. This is especially relevant during the current crisis, since the costs of default are higher than ever, which forces heavily indebted countries to assume unsustainable debt obligations (Bolton, 2016). These unsustainable debt levels increase more sharply the funding requirements of the public sector and, hence, there is a risk of the *crowding-out* of private investment (ECB, 2010). The *crowding-out* effect implies that, when fiscal deficit is high, the public sector has to compete with the private sector to obtain funding[7]. Due to this fact, the *crowding-out* effect caused by a high level of public debt and greater sovereign risk will worsen the financial conditions of national firms, thus reducing their ability to extend trade credit (Agca and Celasun, 2012; Broner et al., 2014).

Third, an increase in sovereign risk is associated with a robust increase in the credit risk, and hence the probability of default by non-financial firms (Durbin and Ng, 2005; Borenzstein et al., 2013; Klein and Stellner, 2014). This is because downgrades in sovereign ratings lead to a reduction in national firms' ratings and also because governments' financial difficulties imply important changes in the economic situation of the country, which can negatively affect firms' creditworthiness (Ferri et al., 2001; Peter and Grandes, 2005; Arteta and Hale, 2008). This higher credit risk, caused by sovereign risk, will increase the probability of default by national firms, which will be transmitted to those firms that have trade credit receivables from the defaulting firms, causing a domino effect (Boissay, 2006)[8]. In this scenario of firms' creditworthiness deterioration and credit risk contagion, firms will be more reluctant to grant trade credit and will also have more difficulty in accessing it (Love and Zaidi, 2010; Bastos and Pindado, 2013; Tsuruta, 2013).

Finally, firms will tend to increase their cash reserves to deal with the huge credit shortage and the funding uncertainties caused by high sovereign risk (Opler et al., 1999; Campello, et al., 2010; Acharya et al., 2013). This liquidity hoarding will reduce the supply of trade credit.

[7] The *crowding-out* effect of private investment by public investment has been widely analyzed (see, among others, Frankel, 1986; Arnott and Stiglitz, 1991; Frey and Oberholzer-Gee, 1997).

[8] Jacobson and Schedvin (2015) show that trade credit losses are one of the main channels in the propagation of corporate failures.

Not only do the severe financial restrictions caused by sovereign risk affect trade credit directly, but they also impede the functioning of the trade credit channel of monetary policy. According to the trade credit channel, a restrictive monetary policy leads to an increase in the use of trade credit to offset the contraction in bank lending. In this context, firms that are less vulnerable to bank lending restrictions and more capable of accessing capital markets, act as funding conduits to their financially constrained clients by extending trade credit (Meltzer, 1960; Nilsen, 2002). However, trade credit cannot increase during monetary restrictions in countries with high sovereign risk, since, as we mentioned previously, national firms suffer greater funding difficulties, have more credit risk, and higher liquidity hoarding (Campello et al., 2010; Agca and Celasun, 2012; Klein and Stellner, 2014).

Therefore, we propose that an increase in sovereign risk will lead to a reduction in the volume of trade credit. In addition, the increase in the volume of trade credit, caused by monetary restrictions, will be less pronounced in countries with higher sovereign risk.

3. EMPIRICAL ANALYSIS

3.1. Selection of the sample

We used a sample of medium and big firms[9] from twelve Eurozone countries[10] during the period 2005 to 2012. These countries were selected so as to allow analysis of the effect of sovereign risk on the trade credit channel of monetary policy, avoiding the bias caused by different monetary policies. We included non-financial firms, which belong to 8 industries whose two-digit code sector is between 11 and 49, according to the NAICS (North American Industry Classification System)[11]. We removed those firms that fulfil some of the following requirements (Ferrando and Mulier, 2013; Garcia-Appendini and Montoriol-Garriga, 2013): (1) Firms with negative values for total assets, trade credit, sales, tangible fixed assets, bank loans, inventories or cash; (2) Firms whose ratio of tangible fixed assets, bank loans, inventories, cash or internal

[9] According to the European Commission Recommendation of 6 May 2003 (2003/361/EC), the category of medium- and big-sized firms comprises firms that employ more than 50 persons and have an annual turnover of more than €10 million, and/or an annual balance sheet total of more than €10 million.
[10] Our sample comprises the original eleven countries (Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain) plus Greece.
[11] NAICS industries, whose two-digit code is between 11 and 49, include the following: Agriculture, Forestry, Fishing and Hunting; Mining, Quarrying, and Oil and Gas Extraction; Utilities; Construction; Manufacturing; Trade; Transportation and Warehousing.

resources over total assets are greater than 100% or lower than -100%; and (3) Firms whose sales variation is greater than 100% in a year.

Since we used the System-GMM methodology for panel data and calculated the growth rates of several variables, we only analyzed those firms for which data was available for a minimum of five consecutive years between 2005 and 2012. This condition is essential to test for second-order serial correlation, which is performed to ensure the robustness of the estimates made by System-GMM (Arellano and Bond, 1991).

Table 1 shows the number of firms and observations from each country and the number of observations per year. Table 2 depicts the industry breakdown for the sample. The financial information on each firm was taken from the Amadeus database. The macroeconomic information was taken from the World Development Indicators database of the World Bank, OECD statistics, and EuroStat.

[Insert Tables 1 & 2]

3.2. Econometric model and data

To test the hypotheses, we propose the following model, based on the approach of previous papers to trade credit (Atanasova and Wilson, 2003; Love et al., 2007; Kestens et al., 2012). These studies regress trade credit variables on a group of control variables and monetary policy indicators. We contribute to these empirical models by adding sovereign risk variables and their interactions with the monetary policy indicators.

$$TC_{i,t} = \alpha_0 + \alpha_1 SR_{m,t} + (\alpha_2 + \alpha_3 SR_{m,t}) * \Delta i_{m,t} + \gamma X_{i,t} + \sum_{t=1}^{7} \tau_t Year_t + \sum_{m=1}^{11} \vartheta_m Country_m + \sum_{s=1}^{6} \mu_s Industry_s + \varepsilon_{i,t} \quad (1)$$

In model (1), trade credit (*TC*) is the dependent variable. We used two measures of trade credit: trade credit payables and trade credit receivables. Trade credit payables (*TCPAY*) show the volume of trade credit that firms obtain from suppliers. It is the ratio of accounts payable to total sales. Trade credit receivables (*TCREC*) represent the amount of trade credit that firms provide to customers. It is measured by the level of accounts receivables over total sales[12].

SR is the sovereign risk, measured as sovereign risk premium: the sovereign bond yield spread of a country relative to that of Germany (Codogno et al., 2003; Bernoth and Wolff, 2008; Bernoth et al., 2012; Cantero-Saiz, et al., 2014). Sovereign bond yield spread is widely used to measure sovereign risk, because it captures the country's credit risk (probability of sovereign default) and liquidity risk. We expressed *SR* as a dummy variable to control for high and low sovereign risk countries. According to Bessler and Wolff (2014), sovereign risk is high when the risk premium of a country relative to that of Germany is larger than 100 basis points. Thus, the variable *SR* takes the value of 1 when it is greater than 100 basis points and 0 otherwise. In previous sections, we have postulated that an increase in sovereign risk leads to a reduction in trade credit. Thus, we expect a negative relationship between sovereign risk and trade credit.

The monetary policy indicator Δi is measured by the change in the short-term money market rate (Ehrmann et al., 2003; Altunbas et al., 2010; Olivero et al., 2011). To analyze if the effects of monetary policy on trade credit differ between low and high sovereign risk countries, we included interaction terms between the monetary policy indicator and the sovereign risk variable ($SR_t*\Delta i_t$). The effects of monetary policy on trade credit when sovereign risk is low (*SR* dummy = 0) are measured by the coefficient α_2, while the effects when sovereign risk is high (*SR* dummy = 1) are reflected by the sum of the coefficients $\alpha_2 + \alpha_3$. We expect that the coefficient α_2 will have a significant and positive sign and the sum of the coefficients $\alpha_2 + \alpha_3$ a negative one, since previously we have postulated that the increase in trade credit, caused by a monetary restriction, is less pronounced in countries with higher sovereign risk.

Finally, $X_{i,t}$ is a vector of control variables, which consists of variables frequently encountered in empirical literature on trade credit. All these control variables and their expected relationship with trade credit payables and trade credit receivables are explained below.

[12] By scaling the two measures of trade credit by sales, we control for declines in economic activity, which are commonly associated with crises (Love et al., 2007; Garcia-Appendini and Montoriol-Garriga, 2013).

ΔSALES is the growth rate in sales from firm *i* in year *t*, relative to year *t-1*. Firms with higher sales growth are perceived as fast growing clients by their suppliers and this will induce them to provide more trade credit (Atanasova and Wilson, 2003; Molina and Preve, 2012). Hence, we expect a positive relationship between sales growth and trade credit payables. As regards trade credit receivables, firms with low sales growth may use the extension of trade credit to boost their sales (Petersen and Rajan, 1997). Thus, we expect a negative relationship between sales growth and trade credit receivables.

SIZE is the log of total assets. Larger firms have better access to bank and capital markets; so, they can avoid more expensive trade credit financing (Kestens et al., 2012; Molina and Preve, 2012). Hence, we expect a negative relationship between size and trade credit payables. As regards trade credit receivables, larger firms have fewer financial constraints and are, therefore, considered more creditworthy than their smaller counterparts. Consequently, we can expect a positive relationship between size and trade credit receivables (Schwartz, 1974). However, as trade credit can serve as a signal of product quality and firm reputation, large firms with a better reputation in the market do not need to show additional quality signals and thus, they provide less trade credit (Deloof and Jegers, 1996). However, smaller firms, whose reputation is usually much less, remain more willing to offer trade credit to their customers to boost their sales (Long et al., 1993). As a result, the relationship between size and trade credit receivables may also be negative.

LIQ is defined as the ratio of cash balances to total assets. Firms with liquidity problems are supposed to have a higher need for trade credit financing (Kohler et al., 2000). Consequently, we can expect a negative relationship between liquidity and trade credit payables. However, suppliers may be reluctant to offer trade credit to illiquid firms; so, a positive relationship can also be possible (Kestens et al., 2012). As regards trade credit receivables, more liquid firms are expected to be more capable of providing trade credit to their customers. Thus, a positive relationship can be expected between liquidity and trade receivables (Ng et al., 1999; Love et al., 2007). On the other hand, firms may be unwilling to extend trade credit to customers if firms pursue a higher liquidity goal (Bougheas et al., 2009); thus, we could also have a negative relationship between liquidity and trade credit receivables.

INV is the ratio of inventory to total assets. Suppliers will provide more trade credit to firms with bigger inventory, because in case of bankruptcy, the inventory can usually be liquidated easily (Taketa and Udell, 2007). In consequence, we can expect a positive relationship between inventory and trade credit payables. Concerning trade credit receivables, firms with large inventories of finished goods bear high storage costs. To avoid these storage costs, they may boost sales by extending trade credit to their customers (Bougheas et al., 2009). Based on this assumption, we expect a positive relationship between inventory and trade credit receivables. On the contrary, we could also find a negative relationship, since both inventories and accounts receivables are current assets and, hence, are substitutes from an asset management perspective (Choi and Kim, 2005).

INTRES are calculated as the ratio of cash flow to total assets. The *pecking order* theory postulates that firms with more internally generated resources prefer to use them to finance their activities instead of using costlier external funding (Myers and Majluf, 1984). Thus, we expect a negative relationship between internally generated resources and trade credit payables. Concerning trade credit receivables, firms that generate more cash internally have more resources to offer trade credit to their customers (Petersen and Rajan, 1997; Biais and Gollier, 1997). Hence, we can expect a positive relationship between internally generated resources and trade credit receivables.

COL is the ratio of tangible fixed assets over total assets, and it is a determinant of trade credit payables. Firms with fewer collateralizable assets use more trade credit, because they cannot borrow enough from banks (Tsuruta, 2013). Hence, we expect a negative relationship between collateral and trade credit payables.

LOANS is the ratio of bank loans over total assets. Firms with poor access to bank financing tend to rely more on trade credit (Petersen and Rajan, 1994). Thus, we expect a negative relationship between bank loans and trade credit payables. As regards trade credit receivables, better access to bank loans allows firms to extend more trade credit to their customers (Meltzer, 1960; Nilsen, 2002). Consequently, we expect a positive relationship between bank loans and trade credit receivables.

Table 3 provides a summary of the independent variables included in Equation (1).

[Insert Table 3]

Country, year, and industry dummies were included to capture country, year, and industry-specific factors. The error term is $\varepsilon_{i,t}$; i = 1,2,…, N indicates a specific firm i; m = 1,2,…, M indicates a particular country m; t = 1,2,…, T indicates a particular year t; s = 1,2,…, S indicates a specific industry s and j denotes the number of lags.

Table 4 presents the descriptive statistics of the variables used in the analysis. Table 5 shows the correlations between variables to identify potential collinearity problems between variables.

[Insert Tables 4 & 5]

3.3. Methodology

The model in Equation (1) was estimated using two steps System-GMM (Generalized Method of Moments), which is consistent with the presence of any pattern of heteroskedasticity and autocorrelation. This method allows for controlling the problems of endogeneity, besides allowing us to obtain consistent and unbiased estimates by using lagged independent variables as instruments (Arellano and Bond, 1991)[13]. The monetary policy indicator and the macroeconomic variables are considered exogenous, while firm-specific characteristics are considered endogenous (Jimborean, 2009). The exogenous variables were instrumented by themselves. For the endogenous variables, we followed the approach of Keasey et al. (2015) and used as instruments a number of lags that satisfy both exogeneity and strength. To choose the best instruments, we first used the following set of instrumental variables: for the equations in differences we initially considered from t – 2 to t – 6 lags and for the equations in levels from t – 2 to t – 4 lags[14]. To analyze the exogeneity of these instrumental variables, we ran a difference-in-Hansen test of exogeneity for this subset of instruments, under the null hypothesis that the instruments are exogenous. In this regard, we deleted from the instrument set all the instruments that are not exogenous. Table 6 shows the results of this estimation.

[13] The System-GMM estimator can provide stronger instruments and lower bias, since it considers both first-differenced and levels equations (Blundell and Bond, 1998; Bonaimé et al., 2014; Keasey et al., 2015).

[14] Wintoki et al. (2012) also considered a maximum of t – 6 and t – 4 lags for the equations in differences and in levels respectively.

[Insert Table 6]

First, column 3 in Table 6 shows the difference-in-Hansen test of the exogeneity of the instruments for the equations in differences (when the instruments are in levels). For instance, we used as instruments for the variable *ΔSALES* its lags in t – 4 and t – 5 (here we do not reject the null hypothesis, p-values = 0.433 and 0.071, respectively), since the lags from t – 2, t – 3 and t – 6 are not exogenous (here we do reject the null hypothesis, all p-values = 0.000). Second, column 4 depicts the difference-in-Hansen test of exogeneity of the instruments for the equations in levels (when the instruments are in differences). For example, we used as instruments for the variable *SIZE* its lag in t – 4, since they are exogenous when lagged four periods (p-value = 0.465), but not for the rest of the periods (p-values = 0.000 and 0.006 in t – 2 and t – 3 respectively). For the rest of the variables, we proceeded in the same way (see Table 6).

We also analyzed the strength of the instruments through two additional tests (Wintoki et al., 2012; Keasey et al., 2015). In the first test, we studied each endogenous variable separately to assess whether the instruments provide significant explanatory power over the endogenous variables, focusing on the *F*-statistics from the first-stage OLS regressions. We ran two different regressions for each endogenous variable: one for the equations in differences (where the instruments are in levels), and the other for the equations in levels (where the instruments are in differences). In the second test we calculated the Cragg-Donald statistics from a two-stage OLS regression for the equations in differences and for the equations in levels respectively. This is a joint test, which is more informative than the *F*-statistics when there is more than one endogenous variable.

Table 7 shows the results of this analysis. The *F*-statistics for all the first-stage regressions are significant and higher than 10, which is the critical value suggested by Staiger and Stock (1997). It implies that the instruments provide significant explanatory power for the endogenous variables. Finally, we examined the Cragg-Donald statistics. To calculate these statistics we used 16 instruments for the equations in levels and 19 for the equations in differences. For the equations in levels, the Cragg-Donald statistic is 17.60. This value exceeds all the critical values from Table 5.1 of Stock and Yogo

(2005) for a bias lower than 10% when the number of instruments (K) is equal to 16[15]. Thus, with this Cragg-Donald statistic, we can confirm that the bias from using these instruments in the equations in levels is less than 10% of the bias from an OLS regression, at the 5% level of significance. For the equations in differences, the Cragg-Donald statistic is 3.50. This value is similar to the one that Keasey et al. (2015) consider acceptable for confirming that the bias of using the instruments is less than 30% of the bias from an OLS regression, at the 5% level of significance.

[Insert Table 7]

3.4. Empirical results

The results of the empirical specification are divided into two parts according to the way of measuring sovereign risk (*SR*). On one hand, we have considered sovereign risk as a dummy variable that can adopt two possible values (0 if *SR* is low and 1 if *SR* is high)[16], while on the other hand, we have considered sovereign risk as a continuous variable and, hence, it can adopt infinite values.

3.4.1. Sovereign risk (SR) as a dummy variable

Table 8 shows the results when sovereign risk (*SR*) is a dummy variable. In model (a) we analyzed trade credit payables (*TCPAY*). The variable *SR* is significant with a negative coefficient. Thus, firms in high sovereign risk countries receive less trade credit as we proposed. Firms that operate in higher sovereign risk countries have greater credit risk that can be transmitted to their potential suppliers, which is why these suppliers are more reluctant to provide credit to those firms.

[Insert Table 8]

The variable Δi, which measures the effects of monetary policy on trade credit payables when sovereign risk is low ($SR = 0$), has a significant and positive coefficient. Therefore, an increase in the short-term money market rate leads to an increase in trade credit received, as the trade credit channel suggests. The interaction term between monetary policy and sovereign risk ($\Delta i_t * SR_t$) is significant and negative, so the effects

[15] Stock and Yogo (2005) developed a set of critical values for evaluating the strength or weakness of instruments for models containing up to three endogenous variables.
[16] As we mentioned previously, sovereign risk is high (*SR* dummy = 1) when the risk premium of a country relative to that of Germany is greater than 100 basis points (Bessler and Wolff, 2014).

of monetary policy on trade credit payables when sovereign risk is high (*SR* = 1) are statistically significantly different from the effects when sovereign risk is low (*SR* = 0). Thus, we need to carry out the linear restriction test of the sum of the coefficient associated with Δi_t and the coefficient associated with the interaction between Δi_t and SR_t (represented in Table 8 by *LR Test. SR*). *LR Test. SR*, which measures the effects of monetary policy on trade credit received when sovereign risk is high (*SR* = 1), is not significant. Thus, the positive and significant effect of monetary restrictions on trade credit payables reported when sovereign risk is low (*SR* = 0), disappears when sovereign risk is high (*SR* = 1). This result can be due to the fact that in high sovereign risk countries, greater funding difficulties, high firms' probability of default, and credit contagion effects outweigh the positive impact of monetary contractions on trade credit received.

In Table 8, model (b), we analyzed trade credit receivables (*TCREC*). The variable *SR* is negative and significant, so firms in high sovereign risk countries extend less trade credit as we proposed. High sovereign risk seriously damages the financial conditions of firms and makes them increase precautionary liquidity, which is why they provide less credit.

The variable Δi, which measures the effects of monetary policy on trade credit supply in low sovereign risk countries (*SR* = 0), is positive and significant. It implies that monetary restrictions increase the provision of trade credit as the trade credit channel postulates. The interaction term between monetary policy and sovereign risk (Δi_t*SR_t) has a significant and negative coefficient, so the effects of monetary policy on trade credit receivables in high sovereign risk countries (*SR* = 1) differ significantly from the effects in low sovereign risk countries (*SR* = 0). If we consider the linear restriction test *LR Test. SR*, which measures the effects of monetary policy on trade credit supply when sovereign risk is high (*SR* = 1), it is not significant. It means that, during monetary restrictions, trade credit provision does not increase in high sovereign risk countries. Similar to trade credit received in model (a), the severe financial restrictions caused by sovereign risk have offset the positive effects of monetary contractions on trade credit supply.

Regarding the control variables, the variable $\Delta SALES$ is negative and significant, so firms with lower sales growth extend more trade credit, probably to boost sales

(Petersen and Rajan, 1997). The variable *SIZE* has a significant and positive coefficient, and hence, larger firms provide more trade credit (Schwartz, 1974). Finally, the variables *LIQ* and *COL* are negative and significant (Bougheas et al., 2009).

3.4.2. Sovereign risk (SR) as a continuous variable

In the previous section, we analyzed the trade credit channel in low and high sovereign risk countries, by using a sovereign risk dummy that is equal to 1 when the risk premium is larger than 100 basis points and 0 otherwise. We reported that high sovereign risk makes trade credit decline, thus offsetting the positive effects of monetary restrictions on this credit. To analyze more exactly at which level of sovereign risk trade credit starts to decline, we included the continuous variable of sovereign risk (*SR*)[17]. Table 9 shows the results of this analysis.

[Insert Table 9]

In model (a), we analyzed trade credit payables (*TCPAY*). The variable of sovereign risk (*SR*) is not significant. The coefficient associated with the monetary policy indicator (Δi), which captures the effect of monetary policy changes on trade credit payables when sovereign risk is zero, is positive and statistically significant, so higher interest rates lead to an increase in trade credit payables as we reported previously. In this analysis, we included the interaction between monetary policy and the sovereign risk variable ($\Delta i*SR$), which are continuous. Because of the interaction between two continuous variables, the significance and marginal effect of monetary policy on trade credit payables will depend on the value of sovereign risk (*SR*). To capture this marginal effect, we have to take the first derivative of Equation (1) with respect to monetary policy:

$$\frac{\partial \mathrm{TC}_{i,t}}{\partial \Delta \mathrm{i}_{m,t}} = \alpha_2 + \alpha_3 SR_{m,t} \qquad (1.1)$$

The coefficient α_2 denotes the marginal effect of monetary policy on trade credit payables when sovereign risk (*SR*) is zero. $\alpha_2 + \alpha_3$ denote the marginal effect of monetary policy on trade credit payables at one specific point (when sovereign risk (*SR*)

[17] The dummy variable *SR* considers two groups of countries according to their level of sovereign risk (low if *SR* = 0 and high if *SR* = 1), but without considering the different values of sovereign risk within the same group of countries. The inclusion of the continuous variable *SR* complements the previous analysis, since it considers all the possible values that *SR* can adopt. Therefore, it allows analysis of how the marginal effects of monetary policy on trade credit vary depending on the value of *SR*.

has a value of 1). Since sovereign risk (*SR*) is a continuous variable and, hence, can adopt infinite values, the marginal effect in Equation (1.1) changes with the level of sovereign risk; so, we need to use plots to interpret the results properly[18].

Figure 2 reports the marginal effect of monetary policy on the level of trade credit payables in relation to risk premium when there is an increase in the short-term money market rate (a restrictive monetary policy). The dotted lines represent the 90% confidence interval[19]. Confidence intervals of 90% allow us to determine the conditions under which the monetary policy indicator has a statistically significant effect on trade credit payables (whenever both upper and lower bounds of the 90% confidence interval are either above or below zero).

[Insert Figure 2]

According to the results of Figure 2, an increase in the short-term money market rate leads to an increase in the volume of trade credit received in countries with a not very high risk premium. In this regard, the marginal effect on trade payables is similar (between 0.0144 and 0.0100) in all the countries whose risk premium is lower than 4.07%[20]. Beyond this point, the marginal effect is not significant; so, there is no evidence in our sample that firms in high sovereign risk countries increase trade credit received during monetary restrictions. All firms in these countries have high credit risk that can be transmitted to their suppliers, which may outweigh the increase in trade credit received caused by monetary contractions.

As regards the control variables, the variable *INTRES* is significant with a negative coefficient, so firms that generate more internal resources prefer to use them to finance their investment activities and reduce the use of trade credit (Myers and Majluf, 1984).

In Table 9, model (b), we analyzed trade credit receivables (*TCREC*). Sovereign risk (*SR*) is negative and statistically significant, so greater sovereign risk leads to a reduction in trade credit receivables as we reported previously. Besides, monetary policy (Δi) is significant with a positive coefficient, which means that monetary

[18] The interpretation of the interaction of continuous variables is thoroughly explained in Brambor et al. (2006) and Berry et al. (2012).
[19] We followed Aiken and West (1991) to compute the confidence intervals.
[20] This comprises all the countries of the sample except for Greece since 2010, Ireland and Portugal since 2011, and Spain in 2012.

contractions produce an increase in the supply of trade credit when sovereign risk (*SR*) is zero. Regarding the interaction between monetary policy and sovereign risk (Δi**SR*) in model (b), since we are dealing with the interaction of two continuous variables (monetary policy and sovereign risk), the marginal effect of monetary policy on trade credit receivables will depend on the value of sovereign risk. To capture this marginal effect, we have to take the derivative of Equation (1) with respect to monetary policy, as reported in Equation (1.1), and construct plots to interpret the results properly.

Figure 3 represents the marginal effect of monetary policy on trade credit supply in relation to the risk premium when there is an increase in the short-term money market rate. When the interest rate in the money market increases, trade credit receivables increase in countries with a risk premium lower than 0.27%[21]. The marginal effect is similar in all these countries (between 0.0149 and 0.0120). However, beyond this level of risk premium, there is no evidence in our sample that monetary restrictions lead to an increase in trade credit extended. Firms in higher sovereign risk countries face serious financial constraints and maintain more precautionary liquidity, which offsets the increase in trade credit supply caused by monetary contractions.

[Insert Figure 3]

Concerning the signs and significance of the control variables, they are similar to those obtained in previous models.

Finally, we controlled for the existence of structural breaks by interacting the sovereign risk indicator (*SR*) with a *PRECRISIS* dummy. This dummy takes the value of 1 from 2005 to 2007 and 0 otherwise. Therefore, it represents the years before the outbreak of the crisis[22]. Table 10 shows the results of this analysis.

[Insert Table 10]

In Table 10, model (a), we examined trade credit payables (*TCPAY*). The variable sovereign risk (*SR*), which represents the influence of sovereign risk on trade credit

[21] Most of the countries of the sample have a risk premium below this level before the crisis, but during the crisis years, only Germany has a risk premium lower than this level during the whole period, while the risk premium of France, the Netherlands and Finland is below this level in some crisis years.

[22] The sovereign risk dummy (*SR*), used in the analysis of Table 8, and the *PRECRISIS* dummy present collinearity problems, since the years after the outbreak of the crisis (*PRECRISIS* = 0) are exactly those when sovereign risk is high (*SR* = 1). Therefore, it is not possible to include the interaction between the sovereign risk dummy (*SR*) and the *PRECRISIS* dummy in the analysis of Table 8.

received during the crisis (when *PRECRISIS* = 0), is not significant. Thus, in this model (a) we do not have evidence that sovereign risk affects trade credit payables after the outbreak of the crisis. The interaction between the variable *SR* and *PRECRISIS* is positive and significant. It means that the effects of sovereign risk on trade credit payables before the crisis (*PRECRISIS* = 1) are statistically significantly different from those during the crisis (*PRECRISIS* = 0). Therefore, we need to carry out the linear restriction test of the sum of the coefficient associated with SR_t and the coefficient associated with the interaction between SR_t and $PRECRISIS_t$ (represented in Table 10 by *LR Test. PRECRISIS*). *LR Test. PRECRISIS*, which measures the effects of sovereign risk on trade credit received before the crisis (*PRECRISIS* = 1), is positive and statistically significant. Hence, before the crisis greater sovereign risk produces an increase in trade credit payables. It is possible that before the crisis, since credit conditions were better and sovereign risk was very low in all the Eurozone countries, firms were able to get more trade credit financing from their suppliers. However, after the outbreak of the financial crisis, sovereign risk increased sharply, which damaged the creditworthiness of national firms, thus making their suppliers more reluctant to provide trade credit to them. This fact would explain why trade payables do not increase during the crisis when sovereign risk is higher. Thus, similar to previous models, these results show that high sovereign risk deteriorates the availability of trade credit for firms.

Regarding the effects of monetary policy in Table 10, model (a), since we are dealing with the interaction of two continuous variables (monetary policy and sovereign risk), the marginal effect of monetary policy on trade credit payables will depend on the value of sovereign risk. To capture this marginal effect, we have to take the derivative of Equation (1) with respect to monetary policy, as reported in Equation (1.1), and construct plots to interpret the results properly. These results, which are shown in Figure 4, are similar to those reported previously.

[Insert Figure 4]

Concerning the signs and significance of the control variables, they are similar to those obtained in previous models.

In Table 10, model (b), we analyzed trade credit receivables (*TCREC*). The variable *SR*, which denotes the effects of sovereign risk on trade credit receivables during the crisis (*PRECRISIS* = 0), is negative and significant, so greater sovereign risk leads to a reduction in trade credit supply after the outbreak of the crisis, as we reported previously. The interaction between *SR* and the *PRECRISIS* dummy ($SR_t*PRECRISIS_t$) is not significant, so the effects of sovereign risk on trade credit supply before the crisis (*PRECRISIS* = 1) are not significantly different from those during the crisis (*PRECRISIS* = 0).

Concerning monetary policy and its interactions with sovereign risk, we have to take the first derivative of Equation (1), as was done in Equation (1.1), and construct plots to show the results. Figure 5 represents the marginal effect of monetary policy on trade credit receivables in relation to the risk premium when there is an increase in the short-term money market rate. These results are similar to those reported previously.

[Insert Figure 5]

As regards the signs and significance of the control variables, they are similar to those reported in previous models.

4. CONCLUSIONS

The financial crisis that started in 2008 raised investor concerns about sovereign risk in several European countries. Greater sovereign risk worsened the financing conditions of the banking sector, leading to a sharp decrease in the supply of loans. The reduction in bank lending has seriously affected the financial conditions of non-financial firms, which has forced them to resort to trade credit as an alternative source of finance. This paper analyses how sovereign risk affects the volume of trade credit, both directly and through monetary policy. Greater sovereign risk has imposed severe financial restrictions on all firms and has forced them to maintain more precautionary liquidity. In addition, greater sovereign risk has increased the probability of default of national firms, raising concerns about credit contagion effects. Because of these problems, we contend that firms will be more reluctant to provide trade credit and will have more difficulties in accessing this source of finance. Consequently, sovereign risk will lead to a reduction in trade credit, thus limiting the positive effects of monetary restrictions on it.

Using a sample of European firms from 2005 to 2012, we find that sovereign risk plays an important role in determining the volume of trade credit in the Eurozone. Trade credit received increases with an increase in sovereign risk, but only in the years prior to the crisis. However, during the crisis, there is no evidence that trade credit received increases with the level of sovereign risk. Regarding trade credit supply, it decreases during the crisis as sovereign risk increases. Additionally, we find that monetary restrictions only lead to an increase in trade credit in countries with low or moderate sovereign risk.

These results would be very helpful to euro area governments in taking actions to mitigate the adverse effects of sovereign risk on national firms. In addition, these results are very interesting in the context of the manner in which monetary policy is being conducted by the European Central Bank. The results suggest that the single monetary policy, which has been in existence in Europe since 1999, has not been affecting all the countries equally. Therefore, the European Central Bank should give due consideration to the sovereign risk differences between countries in implementing its monetary decisions to ensure a smooth transmission of monetary policy through trade credit.

This article has tried to shed light on the effect of sovereign risk on trade credit and on the transmission of monetary policy through this source of finance. However, further analysis is needed to fully understand the role of trade credit and to reduce the negative impact of sovereign risk on the financing conditions of firms.

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REFERENCES

Acharya, V.V., Almeida, H. and Campello, M. (2013), ‘Aggregate risk and the choice between cash and lines of credit’, *The Journal of Finance*, 68 (5), 2059–2116.

Agca, S. and Celasun, O. (2012), ‘Sovereign debt and corporate borrowing costs in emerging markets’, *Journal of International Economics*, 88 (1), 198–208.

Agostino, M. and Trivieri, F. (2014), ‘Does trade credit play a signaling role? Some evidence from SMEs microdata’, *Small Business Economics*, 42 (1), 131–151.

Aiken, L.S. and West, S.G. (1991), *Multiple regression: Testing and interpreting interactions.* Sage Publications, Incorporated.

Albertazzi, U., Ropele, T., Sene, G. and Signoretti, F. (2014), ‘The impact of the sovereign debt crisis on the activity of Italian banks’, *Journal of Banking and Finance*, 46, 387–402.

Altunbas, Y., Gambacorta, L. and Marques-Ibanez, D. (2010), ‘Bank risk and monetary policy’, *Journal of Financial Stability*, 6 (3), 121–129.

Arellano, M. and Bond, S. (1991), 'Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations', *Review of Economic Studies*, 58 (2), 277–297.

Arnott, R. and Stiglitz, J.E. (1991), 'Moral hazard and nonmarket institutions: dysfunctional crowding out or peer monitoring?', *The American Economic Review*, 81 (1), 179–190.

Arteta, C., and Hale, G. (2008), 'Sovereign debt crises and credit to the private sector', *Journal of International Economics*, 74 (1), 53–69.

Atanasova, C.V. and Wilson, N. (2003), 'Bank borrowing constraints and the demand for trade credit: evidence from panel data', *Managerial and Decision Economics*, 24, 503–514.

Bastos, R. and Pindado, J. (2013), 'Trade credit during a financial crisis: A panel data analysis', *Journal of Business Research*, 66, 614–620.

Bernoth, K. and Wolff, G.B. (2008), 'Fool the markets? Creative accounting, fiscal transparency and sovereign risk premia', *Scottish Journal of Political Economy*, 55 (4), 465–487.

Bernoth, K., Von Hagen, J. and Schuknecht, L. (2012), 'Sovereign risk premiums in the European government bond market', *Journal of International Money and Finance*, 31 (5), 975–995.

Berry, W.D., Golder, M. and Milton, D. (2012), 'Improving tests of theories positing interaction', *Journal of Politics*, 74 (3), 653–671.

Bessler, W. and Wolff, D. (2014), 'Hedging European government bond portfolios during the recent sovereign debt crisis', *Journal of International Financial Markets, Institutions and Money*, 33, 379–399.

Biais, B. and Gollier, C. (1997), 'Trade credit and credit rationing', *The Review of Financial Studies*, 10 (4), 903–937.

Blundell, R. and Bond, S. (1998), 'Initial conditions and moment restrictions in dynamic panel data models', *Journal of Econometrics*, 87 (1), 115–143.

Boissay, F. (2006), 'Credit chains and the propagation of financial distress', *European Central Bank Working Paper Series*, 573. European Central Bank, Frankfurt.

Bolton, P. (2016), 'Presidential address: Debt and money: Financial constraints and sovereign finance', *The Journal of Finance*, 71 (4), 1483–1510.

Bonaimé, A.A., Öztekin, O. and Warr, R.S. (2014), 'Capital structure, equity mispricing and stock repurchases'. *Journal of Corporate Finance*, 26, 182–200.

Borenzstein, E., Cowan, K. and Valenzuela, P. (2013), 'The sovereign ceiling lite and bank credit ratings in emerging markets economies', *Journal of Banking and Finance*, 37 (11), 4014–4024.

Bougheas, S., Mateut, S. and Mizen, P. (2009), 'Corporate trade credit and inventories: New evidence of a trade-off from accounts payable and receivable', *Journal of Banking & Finance*, 33 (2), 300–307.

Bofondi, M., Carpinelli, L. and Sette, E. (2013), 'Credit supply during a sovereign crisis', *Bank of Italy Working Paper*, No. 909.

Brambor, T., Clark, W.R. and Golder, M. (2006), 'Understanding interaction models: Improving empirical analyses'. *Political analysis*, 14 (1), 63–82.

Brennan, M.J., Maksimovic, V. and Zechner, J. (1988), 'Vendor financing', *Journal of Finance*, 43 (5), 1127–1141.

Broner, F., Erce, A., Martin, A. and Ventura, J. (2014), 'Sovereign debt markets in turbulent times: Creditor discrimination and crowding-out effects', *Journal of Monetary Economics*, 61, 114–142.

Burkart, M. and Ellingsen, T. (2004), ‘In-Kind finance: A theory of trade credit’, *The American Economic Review*, 94 (3), 569–590.

Campello, M., Graham, J.R. and Harvey, C.R. (2010), ‘The real effects of financial constraints: Evidence from a financial crisis’, *Journal of Financial Economics*, 97 (3), 470–487.

Cantero-Saiz, M., Sanfilippo-Azofra, S., Torre-Olmo, B. and Lopez-Gutierrez, C. (2014), ‘Sovereign risk and the bank lending channel in Europe’, *Journal of International Money and Finance*, 47, 1–20.

Carbó-Valverde, S., Rodríguez-Fernández, F and Udell, G.F. (2016), ‘Trade credit, the financial crisis, and firm access to finance’, *Journal of Money, Credit and Banking*, 48 (1), 113–143.

Casey, E. and O´Toole, C.M. (2014), ‘Bank lending constraints, trade credit and alternative financing during the financial crisis: Evidence from European SMEs’, *Journal of Corporate Finance*, 27, 173–193.

Cavallo, E.A., and Valenzuela, P. (2010), ‘The determinants of corporate risk in emerging markets: an option-adjusted spread analysis’, *International Journal of Finance and Economics*, 15 (1), 59–74.

CGFS (2011), ‘The impact of sovereign credit risk on bank funding conditions’, *CGFS Papers*, (No. 43), July 2011.

Choi, W.G. and Kim, Y. (2005), ‘Trade credit and the effect of macro-financial shocks: evidence from US panel data’, *Journal of Financial and Quantitative Analysis*, 40, 897–925.

Codogno, L., Favero, C. and Missale, A. (2003), ‘Yield spreads on EMU government bonds’, *Economic Policy*, 18 (37), 503–532.

Coulibaly, B., Sapriza, H. y Zlate, A. (2013), `Financial frictions, trade credit, and the 2008–09 global financial crisis´, *International Review of Economics and Finance*, 26, 25–38.

Cuñat-Martínez, V. (2007), ‘Trade credit: suppliers as debt collectors and insurance providers’, *Review of Financial Studies*, 20 (2), 491–527.

Cuñat-Martinez, V. and Garcia-Appendini, E. (2012), ‘Trade credit and its role in entrepreneurial finance’, in Cumming, D. (Ed): *Oxford Handbook of Entrepreneurial Finance*, Oxford University Press, New York, 526–557.

Deloof, M. and Jegers, M. (1996), ‘Trade credit, product quality, and intragroup trade: some European evidence’, *Financial Management*, 25, 33–43.

Diaz, A., Groba, J. and Serrano, P. (2013), ‘What drives corporate default risk premia? Evidence from the CDS market’, *Journal of International Money and Finance*, 37, 529–563.

Durbin, E. and Ng, D. (2005), ‘The sovereign ceiling and emerging market corporate bond spreads’, *Journal of International Money and Finance*, 24 (4), 631–649.

ECB (2010), ‘Financial stability review’, *European Central Bank*, Eurosystem, June 2010.

Ehrmann, M., Gambacorta, L., Martínez-Pagés, J., Sevestre, P. and Worms, A. (2003), ‘Financial systems and the role of banks in monetary policy transmission in the Euro Area’, in: Angeloni. I., Kashyap, A. and Mojon, B. (Eds.), *Monetary policy transmission in the Euro Area*. Cambridge University Press, Cambridge, 235–269.

Emery, G.W. (1984), ‘A pure financial explanation for trade credit’, *Journal of Financial and Quantitative Analysis*, 19 (3), 271–285.

Ferrando, A. and Mulier, K. (2013), ‘Do firms use trade credit to manage growth?’ *Journal of Banking and Finance*, 37, 3035–3046.

Ferri, G., Liu, L.G. and Majnoni, G. (2001), ‘The role of rating agency assessments in less developed countries: Impact of the proposed Basel guidelines’, *Journal of Banking and Finance*, 25 (1), 115–148.

Ferris, J.S. (1981), ‘A transactions theory of trade credit use’, *Quarterly Journal of Economics*, 94 (2), 243–270.

Fostel, A. and Kaminsky, G.L. (2007), ‘Latin America´s access to international capital markets: Good behavior or global liquidity?’, *NBER Working Paper*, 13194.

Frankel, J.A. (1986), ‘International capital mobility and crowding-out in the US economy: Imperfect integration of financial markets or of goods markets?’, in Hafer, R.W. (Ed.), *How open is the US economy?* Lexington, Mass: Heath.

Frey, B.S. and Oberholzer-Gee, F. (1997), ‘The cost of price incentives: an empirical analysis of motivation crowding-out’, *The American Economic Review*, 87 (4), 746–755.

Gama, M., Paula, A. and Van Auken, H. (2014), ‘The interdependence between trade credit and bank lending: Commitment in Intermediary Firm Relationships’, *Journal of Small Business Management*, In Press.

Garcia-Appendini, E. and Montoriol-Garriga, J. (2013), ‘Firms as liquidity providers: Evidence from the 2007–2008 financial crisis’, *Journal of Financial Economics*, 109 (1), 272–291.

Guariglia, A. and Mateut, S. (2006), ‘Credit channel, trade credit channel, and inventory investment: Evidence from a panel of UK firms’, *Journal of Banking & Finance*, 30 (10), 2835–2856.

Jacobson, T. and Schedvin, E. (2015), ‘Trade credit and the propagation of corporate failure: an empirical analysis’, *Econometrica*, 83 (4), 1315–1371.

Jimborean, R. (2009), ‘The role of banks in the monetary policy transmission in the new EU member states’, *Economic Systems*, 33 (4), 360–375.

Keasey, K., Martinez, B. and Pindado, J. (2015), ‘Young family firms: Financing decisions and the willingness to dilute control’, *Journal of Corporate Finance*, 34, 47–63.

Kestens, K., Van Cauwenberge, P. and Bauwhede, H.V. (2012), ‘Trade credit and company performance during the 2008 financial crisis’, *Accounting and Finance*, 52, 1125–1151.

Klein, C. and Stellner, C. (2014), ‘Does sovereign risk matter? New evidence from Eurozone corporate bond ratings and zero-volatility spreads’, *Review of Financial Economics*, 23, 64–74.

Kohler, M., Britton, E. and Yates, A. (2000), ‘Trade credit and the monetary transmission mechanism’, *The Bank of England Working Paper*, (115).

Lin, T.T. and Chou, J.H. (2015), `Trade credit and bank loan: Evidence from Chinese firms´, *International Review of Economics and Finance*, 36, 17–29.

Long, M.S., Malitz, I.B. and Ravid, S.A. (1993), ‘Trade credit, quality guarantees and product marketability’, *Financial Management*, 22 (4), 117–127.

Love, I., Preve, L.A. and Sarria-Allende, V. (2007), ‘Trade credit and bank credit: Evidence from recent financial crises’, *Journal of Financial Economics*, 83 (2), 453–469.

Love, I. and Zaidi, R. (2010), ‘Trade credit, bank credit and financial crisis’, *International Review of Finance*, 10 (1), 125–147.

Meltzer, A.H. (1960), ‘Mercantile credit, monetary policy, and size of firms’, *The Review of Economics and Statistics*, 42 (4), 429–439.

Mateut, S. (2005), ‘Trade credit and monetary policy transmission’, *Journal of Economic Surveys*, 19 (4), 655–670.

Mateut, S., Bougheas, S. and Mizen, P. (2006), 'Trade credit, bank lending and monetary policy transmission', *European Economic Review*, 50, 603–629.

Mateut, S. and Mizen, P. (2002), 'Trade credit and bank lending: an investigation into the determinants of UK manufacturing firms´ access to trade credit', *EUI Working Paper ECO*, No. 2003/3.

Mishkin, F.S. (1995), 'Symposium on the monetary transmission mechanism', *The Journal of Economic Perspectives*, 9 (4), 3–10.

Molina, C.A. and Preve, L.A. (2012), 'An empirical analysis on the effect of financial distress on trade credit', *Financial Management*, 41 (1), 187–205.

Myers, S. and Majluf, N.S. (1984), 'Corporate financing and investment decisions when firms have information that investors do not have', *Journal of Financial Economics*, 13, 187–221.

Nadiri, M.I. (1969): 'The determinants of trade credit in the US total manufacturing sector', *Econometrica: Journal of Econometric Society*, 408–423.

Ng, C.K., Smith, J.K. and Smith, R.L. (1999), 'Evidence on determinants of trade credit terms used in interfirm trade', *Journal of Finance*, 54 (3), 1109–1129.

Nilsen, J.H. (2002), 'Trade credit and the bank lending channel', *Journal of Money, Credit and Banking*, 34 (1), 226–253.

Olivero, M.P., Li, Y. and Jeon, B.N. (2011), 'Consolidation in banking and the lending channel: Evidence from bank-level data in Asia and Latin America', *Journal of International Money and Finance*, 30 (6), 1034–1054.

Opler. T., Pinkowitz, L., Stulz, R. and Williamson, R. (1999), 'The determinants and implications of corporate cash holdings', *Journal of Financial Economics*, 52 (1), 3–46.

Peter, M. and Grandes, M. (2005), 'How important is sovereign risk in determining corporate default risk premia?', The case of South Africa. *International Monetary Fund*.

Petersen, M.A. and Rajan, R.G. (1994), 'The benefits of firm-creditor relationships: evidence from small business data', *Journal of Finance*, 49, 3–37.

Petersen, M.A. and Rajan, R.G. (1997), 'Trade credit: theories and evidence', *Review of Financial Studies*, 10 (3), 661–691.

Pianeselli, D. and Zaghini, A. (2014), 'The cost of firms´ debt financing and the global financial crisis', *Finance Research Letters*, 11 (2), 74–83.

Psillaki, M. and Eleftheriou, K. (2015), 'Trade credit, bank credit, and flight to quality: Evidence from French SMEs', *Journal of Small Business Management*, 53 (4), 1219–1240.

Santos, G.A., Sheng, H.H. and Bortoluzzo, A. (2012), 'The use of trade credit by firms: evidence for Latin America', *Insper Working Paper, Insper Instituto de Ensino e Pesquisa*, (No. wpe_277).

Schwartz, R.A. (1974), 'An economic model of trade credit', *Journal of Financial Quantitative Analysis*, 9, 643–657.

Smith, J.K. (1987), 'Trade credit and informational asymmetry', *Journal of Finance*, 42 (4), 863–869.

Staiger, D. and Stock, J.H. (1997), 'Instrumental variables regression with weak instruments', *Econometrica*, 65, 557–586.

Stock, J.H. and Yogo, M. (2005), 'Testing for weak instruments in linear IV regression', In: Andrews, D. and Stock, J.H. (Eds.), *Identification and inference for econometric models*. Cambridge University Press, Cambridge, 80–108.

Taketa, K. and Udell, G.F. (2007), ‘Lending channels and financial shocks: The case of small and medium-sized enterprise trade credit and the Japanese banking crisis’, *Monetary and Economic Studies*, 25 (2), 1–44.

Tsuruta, D. (2013), ‘Credit contagion and trade credit: evidence from small business data in Japan’, *Asian Economic Journal*, 27 (4), 341–367.

Valderrama, M. (2003): ‘The role of trade credit and bank lending relationships in the transmission mechanism in Austria’, In Angeloni, I. Kashyap, A. and Mojon, B. (eds), *Monetary policy transmission in the euro area*, Cambridge: Cambridge University Press, 221–232.

Wilner, B.S. (2000), ‘The exploitation of relationships in financial distress: the case of trade credit’, *Journal of Finance*, 55 (1), 153–178.

Wintoki, M.B., Linck, J.S. and Netter, J.M. (2012), ‘Endogeneity and the dynamics of internal corporate governance’, *Journal of Financial Economics*, 105, 581–606.

TABLES

Table 1: Sample

PANEL A: NUMBER OF FIRMS PER COUNTRY		
	Number of observations	**Number of firms**
Austria	2,251	455
Belgium	22,825	3,209
Finland	6,684	1,027
France	53,952	8,625
Germany	29,052	5,358
Greece	9,799	1,466
Ireland	1,560	331
Italy	92,853	13,346
Luxembourg	687	118
Netherlands	1,816	313
Portugal	17,635	3,127
Spain	57,130	8,489
Total	**296,244**	**45,864**

PANEL B: NUMBER OF OBSERVATIONS PER YEAR									
	2005	2006	2007	2008	2009	2010	2011	2012	**Total Obs.**
N. of observations	30,903	31,229	35,663	41,660	42,985	40,975	38,517	34,312	**296,244**

Table 2: Industry breakdown

Industry	Number of observations	Number of firms	Proportion of each industry over the whole sample
Agriculture, Forestry, Fishing and Hunting	3,430	535	1.17%
Mining, Quarrying, and Oil and Gas Extraction	2,142	346	0.75%
Utilities	8,226	1,303	2.84%
Construction	29,163	4,644	10.12%
Manufacturing	143,923	21,935	47.83%
Trade	87,337	13,631	29.72%
Transportation and Warehousing	22,023	3,470	7.57%
Total	**296,244**	**45,864**	**100%**

Table 3: Independent variables

VARIABLE	PROXY
Sovereign risk (*SR*)	Sovereign bond yield spread of a country relative to Germany
Monetary policy (Δi)	Change in the short-term money market rate
(Δi*SR)	Interaction term between sovereign risk and monetary policy
Sales growth ($\Delta Sales$)	(Sales in year t – Sales in year t-1)/Sales in year t-1
Size (*SIZE*)	Log(Total Assets)
Liquidity (*LIQ*)	Cash balances/Total Assets
Inventory (*INV*)	Inventory/Total Assets
Internal resources (*INTRES*)	Cash flow/Total Assets
Collateral (*COL*)	Tangible fixed assets/Total Assets
Bank loans (*LOANS*)	Bank loans/Total Assets

Table 4: Sample statistics

Variable	Mean	Standard deviation	Minimum	Maximum
TCPAY	0.1629	0.2933	0.0000	76.4414
TCREC	0.2536	0.6228	0.0000	249.1792
Δ SALES	0.0103	0.1943	-0.9987	0.9998
SIZE	10.1242	1.2891	4.6562	19.4047
LIQ	0.0777	0.1118	0.0000	0.9866
INV	0.1945	0.1661	0.0000	0.9982
INTRES	0.0650	0.0881	-0.9992	0.9922
COL	0.2294	0.1987	0.0000	0.9973
LOANS	0.1107	0.1403	0.0000	0.9979
SR	1.1449	2.0613	-0.9398	21.0025
Δi	-0.2747	1.4244	-3.4059	1.1984

Table 5: Correlations

	Δ SALES	SIZE	LIQ	INV	INTRES	COL	LOANS	SR	Δi
Δ SALES	1								
SIZE	0.0632	1							
LIQ	0.0121	-0.0815	1						
INV	-0.0025	-0.0484	-0.1520	1					
INTRES	0.1877	-0.0023	0.1740	-0.1343	1				
COL	-0.0333	0.0479	-0.1666	-0.2694	0.0966	1			
LOANS	-0.0241	-0.0373	-0.2590	0.1864	-0.2260	-0.0109	1		
SR	-0.1091	-0.0539	-0.0429	-0.0325	-0.1171	0.0425	0.0925	1	
Δi	0.2687	0.0153	-0.0136	0.0219	0.0566	-0.0451	0.0241	-0.0736	1

Table 6: Difference-in-Hansen tests of exogeneity

Endogenous variable	**Instrument**	**Diff-in-Hansen: equations in differences (p-value)**	**Diff-in-Hansen: equations in levels (p-value)**
ΔSALES	Δ $SALES_{t-2}$	0.000	0.000
	Δ $SALES_{t-3}$	0.000	0.005
	Δ $SALES_{t-4}$	0.433	0.753
	Δ $SALES_{t-5}$	0.071	
	Δ $SALES_{t-6}$	0.000	
SIZE	$SIZE_{t-2}$	0.000	0.000
	$SIZE_{t-3}$	0.000	0.006
	$SIZE_{t-4}$	0.004	0.465
	$SIZE_{t-5}$	0.003	
	$SIZE_{t-6}$	0.070	
LIQ	LIQ_{t-2}	0.000	0.000
	LIQ_{t-3}	0.000	0.978
	LIQ_{t-4}	0.474	0.000
	LIQ_{t-5}	0.010	
	LIQ_{t-6}	0.000	
INV	INV_{t-2}	0.002	0.326
	INV_{t-3}	0.002	0.000
	INV_{t-4}	0.606	0.000
	INV_{t-5}	0.006	
	INV_{t-6}	0.028	
INTRES	$INTRES_{t-2}$	0.000	0.024
	$INTRES_{t-3}$	0.010	0.008
	$INTRES_{t-4}$	0.955	0.279
	$INTRES_{t-5}$	0.003	
	$INTRES_{t-6}$	0.342	
COL	COL_{t-2}	0.000	0.000
	COL_{t-3}	0.002	0.000
	COL_{t-4}	0.000	0.323
	COL_{t-5}	0.174	
	COL_{t-6}	0.202	
LOANS	$LOANS_{t-2}$	0.000	0.272
	$LOANS_{t-3}$	0.001	0.011
	$LOANS_{t-4}$	0.015	0.016
	$LOANS_{t-5}$	0.748	
	$LOANS_{t-6}$	0.000	

Table 7: First-stage OLS regressions and Cragg-Donald statistics for System-GMM estimates

	***F*-statistic**	**p-value**	**R^2**
Panel A. *Dependent variable in levels, explanatory variables (instruments) in differences*			
ΔSALES	185.1	0.0000	0.1002
SIZE	599.6	0.0000	0.0566
LIQ	1,530.2	0.0000	0.1592
INV	829.5	0.0000	0.2222
INTRES	181	0.0000	0.1284
COL	2,029.7	0.0000	0.2047
LOANS	1,147.8	0.0000	0.1636
Cragg-Donald statistic: 17.60			
Panel B. *Dependent variable in differences, explanatory variables (instruments) in levels*			
Δ(ΔSALES)	171.6	0.0000	0.1662
ΔSIZE	97.9	0.0000	0.1208
ΔLIQ	325.3	0.0000	0.0678
ΔINV	814.3	0.0000	0.0672
ΔINTRES	22.8	0.0000	0.0527
ΔCOL	215.4	0.0000	0.0853
ΔLOANS	169.5	0.0000	0.0256
Cragg-Donald statistic: 3.50			

Table 8: Results (Dummy variable for sovereign risk (*SR*))

	(a) Trade credit payables	(b) Trade credit receivables
SR_t	-0.0210 (-2.72) ***	-0.0306 (-2.55) **
Δi_t	0.0093 (1.84) *	0.0140 (1.66) *
Δi_t *SR_t	-0.0026 (-1.67) *	-0.0052 (-2.45) **
$\Delta SALES_{i,t}$	-0.0096 (-0.47)	-0.0729 (-2.64) ***
$SIZE_{i,t}$	0.0088 (0.50)	0.0504 (1.84) *
$LIQ_{i,t}$	0.0037 (0.05)	-0.3401 (-2.88) ***
$INV_{i,1}$	0.0141 (0.22)	-0.1197 (-0.90)
$INTRES_{i,t}$	0.1354 (0.95)	0.0533 (0.32)
$COL_{i,t}$	-0.0390 (-0.78)	-0.1930 (-2.78) ***
$LOANS_{i,t}$	-0.0019 (-0.02)	-0.1651 (-1.09)
LR Test. SR	0.0067 (1.36)	0.0088 (1.10)
Country dummies	Yes	Yes
Year dummies	Yes	Yes
Industry dummies	Yes	Yes
z_1	0.0010	0.0100
z_2	0.0000	0.0000
z_3	0.0000	0.0000
m_2	0.263	0.194
Hansen	0.471	0.517
Diff-in-Hansen	0.456	0.543

Coefficients associated with each variable. In brackets, T-student; *** indicates a level of significance of 0.01, ** indicates a level of significance of 0.05, * indicates a level of significance of 0.1. LR Test. SR is the linear restriction test of the sum of the coefficients associated with Δi_t and Δi_t*SR_t. z_1, z_2 and z_3 are Wald tests of the joint significance of the time, country and industry dummies respectively, under the null hypothesis of no relation. m_2 is the p-value of the 2nd order serial correlation statistic. Hansen is a test of the over-identifying restrictions, asymptotically distributed as X^2 under the null hypothesis of no correlation between the instruments and the error term. Diff-in-Hansen is also a test distributed as X^2 under the null hypothesis of no correlation between the subset of instruments used in the level equations and the error term.

Table 9: Results (Continuous variable for sovereign risk (*SR*))

	(a) Trade credit payables		(b) Trade credit receivables	
SR_t	0.0041 (1.21)		-0.0110 (-1.85)	*
Δi_t	0.0136 (2.48)	**	0.0126 (1.72)	*
Δi_t *SR_t	-0.0009 (-1.00)		-0.0024 (-1.81)	*
$\Delta SALES_{i,t}$	0.0258 (1.48)		-0.0776 (-2.89)	***
$SIZE_{i,t}$	0.0024 (0.18)		0.0223 (1.15)	
$LIQ_{i,t}$	0.0127 (0.21)		-0.2456 (-2.24)	**
$INV_{i,1}$	0.0110 (0.20)		-0.2795 (-3.37)	***
$INTRES_{i,t}$	-0.2305 (-1.97)	**	-0.2381 (-1.66)	*
$COL_{i,t}$	0.0342 (0.92)		-0.1321 (-2.20)	**
$LOANS_{i,t}$	-0.0435 (-0.66)		-0.1403 (-1.16)	
Country dummies	Yes		Yes	
Year dummies	Yes		Yes	
Industry dummies	Yes		Yes	
z_1	0.0000		0.0000	
z_2	0.0002		0.0000	
z_3	0.0385		0.0000	
m_2	0.739		0.121	
Hansen	0.509		0.627	
Diff-in-Hansen	0.538		0.868	

Coefficients associated with each variable. In brackets, T-student; *** indicates a level of significance of 0.01, ** indicates a level of significance of 0.05, * indicates a level of significance of 0.1. z_1, z_2 and z_3 are Wald tests of the joint significance of the time, country and industry dummies respectively, under the null hypothesis of no relation. m_2 is the p-value of the 2nd order serial correlation statistic. Hansen is a test of the over-identifying restrictions, asymptotically distributed as X^2 under the null hypothesis of no correlation between the instruments and the error term. Diff-in-Hansen is also a test distributed as X^2 under the null hypothesis of no correlation between the subset of instruments used in the level equations and the error term.

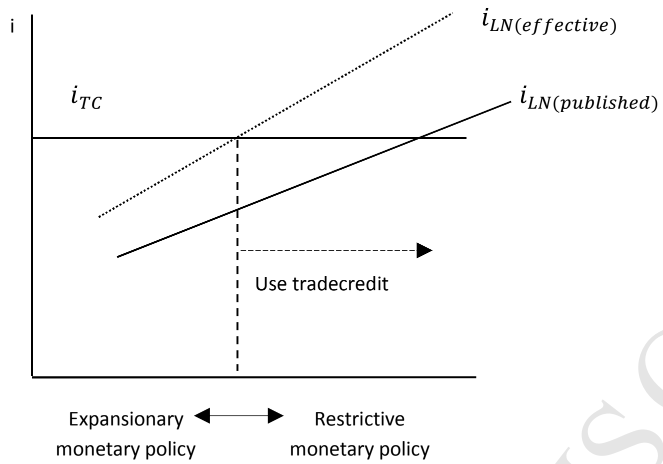
Table 10: Results (Continuous variable for sovereign risk (*SR*) & Structural breaks caused by the crisis)

	(a) Trade credit payables		(b) Trade credit receivables	
SR_t	0.0026 (0.69)		-0.0160 (-2.00)	**
Δi_t	0.0106 (2.46)	**	0.0205 (2.30)	**
Δi_t *SR_t	-0.0014 (-1.40)		-0.0034 (-2.11)	**
SR_t* $PRECRISIS_t$	3.4635 (2.05)	**	2.4331 (0.73)	
$\Delta SALES_{i,t}$	0.0295 (1.80)	*	-0.0147 (-0.61)	
$SIZE_{i,t}$	0.0040 (0.38)		0.0134 (0.68)	
$LIQ_{i,t}$	-0.0049 (-0.09)		-0.2144 (-1.59)	
$INV_{i,t}$	-0.0027 (-0.06)		-0.2478 (-2.80)	***
$INTRES_{i,t}$	-0.1949 (-1.98)	**	-0.4015 (-2.49)	**
$COL_{i,t}$	0.0217 (0.71)		-0.1425 (-2.28)	**
$LOANS_{i,t}$	0.0119 (0.23)		-0.0962 (-0.70)	
LR Test. PRECRISIS	3.4661 (2.05)	**	2.4172 (0.72)	
Country dummies	Yes		Yes	
Year dummies	Yes		Yes	
Industry dummies	Yes		Yes	
z_1	0.0004		0.0318	
z_2	0.0000		0.0002	
z_3	0.0000		0.0000	
m_2	0.116		0.962	
Hansen	0.443		0.713	
Diff-in-Hansen	0.432		0.732	

Coefficients associated with each variable. In brackets, T-student; *** indicates a level of significance of 0.01, ** indicates a level of significance of 0.05, * indicates a level of significance of 0.1. LR Test. PRECRISIS is the linear restriction test of the sum of the coefficients associated with SR_t and SR_t*$PRECRISIS_t$. z_1, z_2 and z_3 are Wald tests of the joint significance of the time, country and industry dummies respectively, under the null hypothesis of no relation. m_2 is the p-value of the 2nd order serial correlation statistic. Hansen is a test of the over-identifying restrictions, asymptotically distributed as X^2 under the null hypothesis of no correlation between the instruments and the error term. Diff-in-Hansen is also a test distributed as X^2 under the null hypothesis of no correlation between the subset of instruments used in the level equations and the error term.

FIGURES

Fig. 1: Trade credit vs. loan usage differences across restrictive and expansionary monetary regimes



The cost of trade credit (i_{TC}) is more stable than the effective cost of bank credit ($i_{LN(effective)}$) when monetary conditions vary. A firm will switch to trade credit finance when the effective loan price ($i_{LN(effective)}$) rises above the effective cost of trade credit (i_{TC}), which is more likely to occur during monetary restrictions.

Source: *Atanasova and Wilson (2003)*

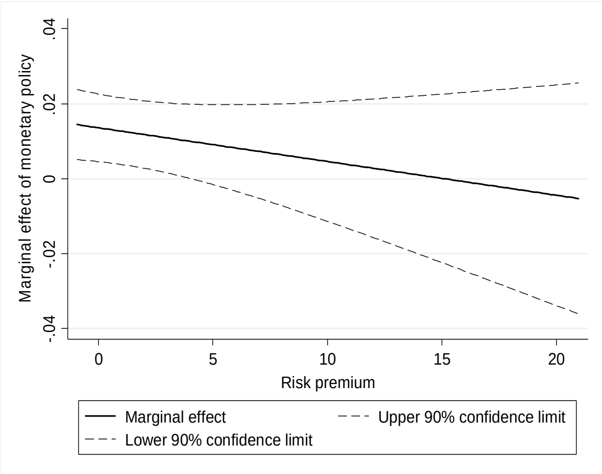


Fig. 2. Marginal effect of monetary policy on trade credit payables in relation to risk premium when short-term money market rate increases. Based on model (a), Table 9.

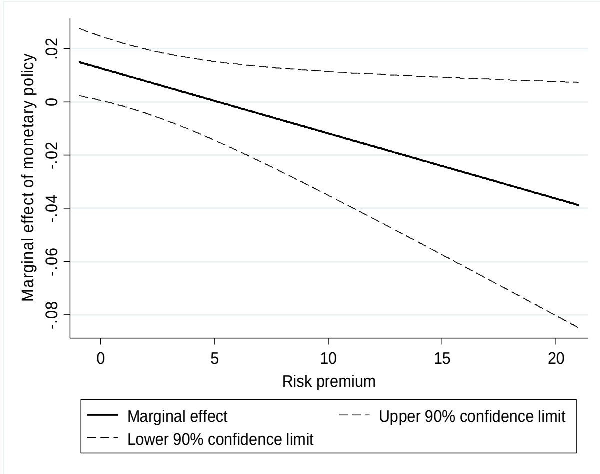


Fig. 3. Marginal effect of monetary policy on trade credit receivables in relation to risk premium when short-term money market rate increases. Based on model (b), Table 9.

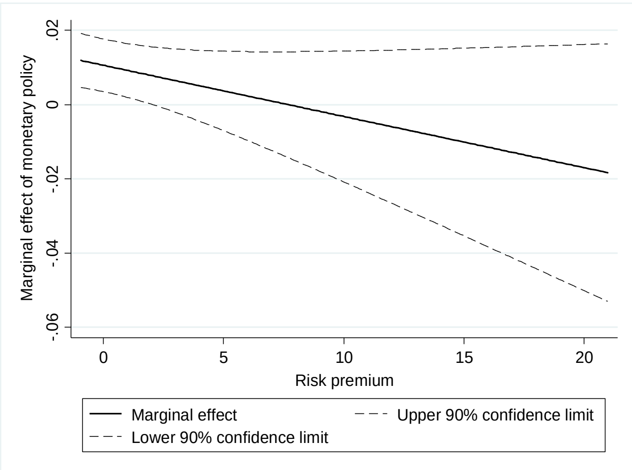


Fig. 4. Marginal effect of monetary policy on trade credit payables in relation to risk premium when short-term money market rate increases. Based on model (a), Table 10.

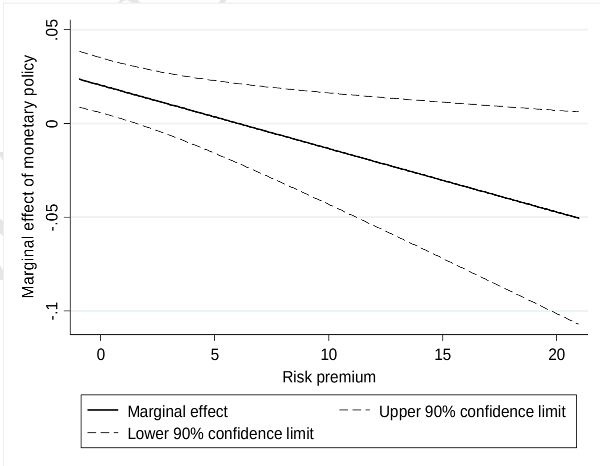


Fig. 5. Marginal effect of monetary policy on trade credit receivables in relation to risk premium when short-term money market rate increases. Based on model (b), Table 10.

TRADE CREDIT, SOVEREIGN RISK AND MONETARY POLICY IN EUROPE

HIGHLIGHTS

We study how sovereign risk affects trade credit, directly and through monetary policy.

During the crisis, trade credit supply decreases as sovereign risk increases.

Trade credit received increases as sovereign risk rises, but only before the crisis.

Monetary restrictions increase trade credit only in low-moderate sovereign risk countries.