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A CROSS-COUNTRY STUDY ON TRADE CREDIT SUPPLY AND FINANCIAL CRISIS

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Dissertação apresentada à Escola de Administração de Empresas de São Paulo da Fundação Getulio Vargas, como requisito para obtenção do título de Mestre em Gestão Internacional.

Campo de Conhecimento: Finanças

Orientador: Prof. Dr. Rafael F. Schiozer

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To my parents Sérgio and Ivani
and my 'little' sister Fernanda
for all their love and support.
ありがとう

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"Learn from yesterday, live for today, hope for tomorrow.

The important thing is not to stop questioning."

Albert Einstein

RESUMO

O objetivo deste trabalho de pesquisa é investigar a oferta de crédito comercial durante períodos de crise financeira em seis países diferentes: Brasil, França, Alemanha, Itália, Espanha e Reino Unido, foram utilizadas informações de empresas de capital aberto entre 2000 e 2011. A literatura internacional documenta que durante o pico de crises financeiras a oferta de crédito comercial aumenta pois as companhias usam o crédito comercial como substituto e/ou complemento ao crédito bancário, apesar de após o momento de pico esta oferta diminui significantemente porque as empresas enfrentam problemas de liquidez causado por escassez de crédito. Mesmo que somente existam evidências pontuais de que a oferta de crédito comercial aumentou durante a crise financeira global de 2008, o efeito pós-crise é perceptível durante a crise Europeia de 2011, pois as empresas europeias diminuíram a oferta de crédito comercial, também evidenciando que estas companhias estavam confrontando problemas de administração de liquidez. Em relação ao uso de crédito comercial como ferramenta de transmissão de capital, nenhuma evidência foi encontrada para provar sua existência em tempo de crise financeira.

Palavras-chave: Crédito Comercial, Recebíveis, Financiamento, Crise Financeira.

ABSTRACT

The objective of this research paper is to investigate the trade credit supply during financial crisis periods in six different countries: Brazil, France, Germany, Italy, Spain and United Kingdom, using information from public listed companies between the years 2000 and 2011. International literature documents that during the peak of financial crisis trade credit supply increases as companies use trade credit as substitute and/or complement to bank loans, although after the peak moment this supply decreases significantly because the firms face liquidity problems caused by credit shortage. Even though there is just punctual evidence that during the 2008 global financial crisis the trade credit supply increased, the post-crisis effect is noticeable during the 2011 European crisis as the European firms decreased the supply of trade credit, also evidencing that these companies were confronting liquidity management issues. Regarding the usage of trade credit as transmission tool, no evidence was found to prove that it happens during financial crisis periods.

Keywords: Trade Credit, Receivables, Financing, Financial Crisis.

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SUMMARY

1. INTRODUCTION

Trade credit is a short-term credit that the suppliers give to their buyers without an intermediary financial agent. In this commercial transaction between the supplier and its client, the payment is due after the goods are delivered (typically in 30 days), but normally the supplier gives a discount if the payment is made before the due date.

The main interesting issue of this form of credit is that many companies use this type of debt – for example in 2011 trade credit accounted for 15.6% of total liabilities of publicly traded companies in Brazil – even though it is more expensive than other short-term funding alternatives offered by financial institutions. In the U.S. the retail business firms are typically offered trade credit in a "2-10 net 30" term (SMITH, 1987); with this term, the buyer has a 2% discount if they pay during the first 10 days (the discount date) after the merchandises are delivered or they can pay the full amount on the 30th day (the due date). As described before, if the customer does not pay until the discount date, they take a short-term credit during the next 20 days at an annual rate of 43.5% (PETERSEN AND RAJAN, 1997) that is well above the rates of short–term loans of banks in the US, even for small enterprises.

Three main non-competing strands of the financial literature explain this apparent contradiction for the existence of trade credit: (i) trade credit can substitute the bank loans; (ii) Biais and Gollier (1997) argue that trade credit can complement the traditional forms of credit. Since suppliers have superior information on their clients, firms may demand trade credit to signal good information to banks; (iii) trade credit can be used to set up or improve the long-term customer relationship between supplier and buyer (WILNER, 2000). Meltzer (1960) found that liquid companies offer more trade credit in order to maintain their supply chain instead of reducing the sales during periods of monetary contraction policy; and (iv) trade credit can be a form of transmission of capital along the players of a supply chain (CARVALHO AND SCHIOZER, 2012).

This study uses the global financial crisis of 2008 and the European debt crisis of 2011 to investigate whether trade credit is a substitute and/or a complement to bank loans in a multi-country setting. During a financial crisis, there is typically a contraction in bank loans, which is not uniform across countries. Larger, less financially constrained firms are better able to access both capital markets and bank lines of credit for funding, whereas smaller firms have

less bank-committed lines of credit and access to capital markets. There is recent empirical evidence that large firms have drawn down lines of credit from banks during the subprime crisis in the United States (IVASHINA AND SCHARFSTEIN, 2012). Therefore, it is reasonable to suspect that large firms have acted as conduits in providing credit to their smaller clients, that faced more restrictions to contract bank loans. Given the hypotheses for the use of trade credit, it is possible to assume that this form of short-term credit can be a good proxy to measure the financial stress that a crisis can create in different countries, since it is highly affected by the contraction of bank loans during extreme cases of financial disruption.

Thus, there are former studies of trade credit behavior during financial crisis in the US, or in several emerging markets but each one during a different time. We believe that it is missing an analysis about a global crisis and how it impacted trade credit in several countries as their economies and financial systems have undergone through diverse consequences, letting a possible empirical investigation on the use of trade credit according to the degree by which each country was affected by the crisis. Hence, this research paper objective is to fill this gap understanding the impact of the recent financial crisis on different economies, emerging and developed nations, by analyzing the supply of trade credit by public listed companies. The study will meet this objective testing trade credit theories (large companies transmission during crisis hypothesis; and substitution and complementarity during credit shortage hypothesis) using a cross-country setting on pooled OLS and panel data estimation.

Moreover, to comprehend better the effect of the crisis a parallel between the Brazilian and European market was done. Since the Brazilian economy was less affected by the crisis compared to European nations, the analysis comprising Brazilian and European firms allow for the identification of the roles of trade credit in the economy (especially it allows the disentangling of the complementarity and the substitution effect). Beyond Brazilian firms, the sample comprises, British, French, German, Italian and Spanish public listed companies. The choice of the countries was given because in 2011 France, Germany, Italy, Spain and United Kingdom represented together 95,0% of the GDP of the European Union (IMF, 2012c), therefore the sample should be significant to correspond to the firms' population of the European Union.

The results showed that during financial crisis there is evidence that trade credit is used as complement to bank loans, although during normal times trade credit plays more the role of substitute of loans. However, surprisingly, as we look at the cross-country results a different outcome is revealed: trade credit supply decreases in a greater scale at more affected economies, and this phenomenon also occurs on the demand side. We could prove that there is evidence that our trade credit hypotheses are valid for a multi-country setting in some cases but not all, leading us to conclude that probably this different outcome appears because these firms face a liquidity management tradeoff during recovering moments.

The study is structured as follows: section 2 presents the literature review on trade credit and liquidity management. The third section describes the hypotheses and the methodology of the study. Section 4 has the data analysis of the economies and the firms' database to understand the empirical analysis results, which are presented on section 5; and finally the section 6 introduces the conclusion and the final considerations.

2. LITERATURE REVIEW

The literature review will be guided by the following order: first the theories about the trade credit specifically; then the liquidity management through monetary tightness periods; and finally the trade credit with focus on the impact during financial crisis periods.

2.1 Trade Credit Theories

The theory of asymmetric information [see Akerlof (1970) and Stiglitz and Weiss (1981)] is a fundamental piece to understand the existence of trade credit as complementary to the financial system. Since the bank lending system has its imperfections in providing loans to good payers, trade credit can fill this gap, since the companies can get credit from their supplier instead of going to financial institutions. During banking panic these problems are aggravated, because banks tend to decrease the amount of available credit lines. As a consequence, interest rates on loans are increased to meet excess demand, which causes trade credit to be more attractive, moreover banks become more selective and trade credit can be used as creditworthiness confirmation.

In order to better understand this phenomenon a deeper analysis about the theories on trade credit and its implications during crisis periods is necessary. Although there are many theories that explain the existence of trade credit on the demand side, Petersen and Rajan (1997) present some good initial theories to justify the suppliers' motivation for trade credit. The first theory is about the financing advantages granted by information available, the buyer's control power and guarantee of existing merchandise. Another theory is about the usage of trade credit to discriminate the price and the final one is related to transaction costs theory.

Schwartz's (1974) describes the economic motivations of the suppliers to provide trade credit. Schwartz says that sometimes the supplier has an easier or cheaper access to the credit market than the buyers; consequently they use their supply chain capacity to pass this credit ahead to other firms and maximize their own profits. Since the supplier may hold superior information about their clients as compared to banks, the suppliers can benefit from this information advantage by specifying the delay of payment as part of the pricing policy of the contract; as the price has a time dimension value, the seller can price the possibility of payment delay and hedge their position if this case occurs.

As discussed previously, the asymmetry of information causes the financial institutions to wrongly choose their borrowers or to deny possible good loans since the information is not accurate. The supplier has a great advantage in this issue (PETERSEN AND RAJAN, 1997), since it is possible for them to gather information on their clients' operations (such as the trends in size and frequency of orders) at a lower cost than banks do; they may also have more timely information about the financial situation of the buyer (based upon historical information on delays).

Petersen and Rajan (1997) state that the suppliers still have other safety advantages as compared to banks when they grant the credit. For example, the sellers have more control of the buyer, since it is normally an essential relationship for the buyer's operations, if the suppliers threaten not to source in the future. Also, the suppliers have a collateral (the merchandise sold), which is more valuable to them than for the banks (MIAN AND SMITH, 1992).

It is clear that if the suppliers can maximize their profits by taking loans from the market and offering credit to their customers at a higher interest rate (net of defaults), they will do it since they have advantages and guarantees that protect them. Moreover, if this credit is cheaper than the rates offered by banks to the buyers, they will not have reasons not to use it. However, past studies showed that even if the trade credit is more expensive than the credit offered by the financial institutions, the buyers still have strong motivations to take this additional credit.

This can be explained by three main theories: (i) trade credit can substitute the bank loans; (ii) trade credit can complement bank loans; and (iii) trade credit can improve the customer relationship between supplier and buyer.

(i) Trade credit can substitute the bank loans

As the financial system credit rationing and the asymmetric information issues favor large companies, Meltzer (1960) supported the idea that large-sized firms with liquid balances accumulate capital to offer trade credit during "tight money" periods, redistributing this cumulated additional capital and restoring the general equilibrium point. Thus, it is possible to

affirm that trade credit is an important source of credit to non-manufacturing and small manufacturing companies, especially during periods of monetary tightness.

Nilsen (2002) also believed that small firms demand trade credit as a substitute to bank loans following the rational created by Meltzer (1960), since it may be their single alternative credit source during monetary contraction periods. However, the evidence found in his research with US firms is that large firms similarly intensify the use of trade credit during these periods and just the very large corporations with a recognized credit standing (with corporate bonds well rated by a credit agency) are able to maintain their great access to bank loans the capital markets, and therefore avoid increasing the demand for trade credit. Therefore, his evidence supports that trade credit is a substitute for bank loans, except for very large, well rated corporations.

(ii) Trade credit can complement the traditional forms of credit

Biais and Gollier (1997) also depart from the assumption that suppliers have private information about their customers that banks do not have. Thus, suppliers could minimize the asymmetric information problem and be more capable of assessing valuable investment projects from their clients than financial institutions are. Banks could observe trade credit granted to a given firm and infer their credit status. Standing to this idea, this was formalized in the model created by Burkart and Ellingsen (2004). They empirically observe that the availability of trade credit is positively correlated to the amount of bank loans granted, because the financial institutions recognize the suppliers' information advantage and consider this additional credit a supplementary asset to diversify the investments. In this sense, trade credit complements the traditional forms of credit, boosting the investments and increasing the disposability of loans.

The comparison between the complementary and the substitution roles of trade credit is explored by Alphonse, Ducret and Séverin (2006); they investigate US small businesses and conclude that both hypotheses are consistent. According to their model, the companies decrease the usage of trade credit when banks increase the amount of loans to the market; in this case trade credit is a substitute to bank loans. Moreover, the paper also presented that trade credit can be considered as complementary source to bank loans, since the informational asymmetry is decisive to explain the firms' debt level and trade credit can be considered as a

proxy for creditworthiness. Another study conducted with Portuguese and Spanish small and medium size enterprises (GAMA, MATEUS AND TEIXEIRA, 2008) also concludes that the two hypotheses (substitution and complementarity) are not mutually exclusive and co-exist in the economy.

(iii) Trade credit can improve the customer relationship between supplier and buyer

Meltzer (1960) was the first to raise the hypothesis that trade credit can created other benefits to the relationship between the supplier and its customers, as the price discrimination, which was tested by Mian and Smith (1992), proving that large firms prefer to provide more trade credit to their buyers in order to boost sales during crisis periods than to practice a direct price reduction.

Other theory is about the impact of the supplier and buyer relationship on the trade credit when the buyer is under financial distress (WILNER, 2000). If the supplier is dependent on its customer, the long-term relationship persuades the supplier to grant more concessions in debt renegotiations to long-term customers. However, the opposite is also true, if the buyer is dependent in this relationship the firms accept to pay higher interest rates during debt renegotiations and rate pricing is also related to the degree of the buyer's dependence on its supplier. Therefore, Wilner (2000) finds evidence that some firms supply trade credit with attractive rates in order to create a dependence relationship of the buyer and the debt renegotiation mainly occurs to protect the capital during financial distress, but it is also used to allow future profits.

(iv) Trade credit is transmitted through the supply chain

Previous research has found that managers tend to transmit trade credit received from their suppliers to their clients trade. Schiozer and Brando (2010) show that the amount of trade credit supplied by Brazilian publicly traded firms is positively related to the amount of trade credit given by their suppliers, a result that was also found by Shi, Young and Zhou (2011) for Chinese firms. Carvalho and Schiozer (2012) survey Brazilian small and medium enterprises and find that managers also mention the transmission of trade credit terms and conditions received from suppliers to their clients. Pike and Cheng (2002) study UK firms and

find that the delay in receiving trade credit supplied to clients causes firms to delay its payments to their suppliers.

2.2 Liquidity Management

Lins, Servaes and Tufano (2010) survey CFOs from 29 countries and find that lines of credit are used as a hedge for future investment opportunities, whereas cash holdings are a hedge against future shocks on expected cash flows. This evidence is consistent with Acharya, Almeida and Campello (2011) that discuss liquidity management by comparing the tradeoffs of holding excess cash versus lines of credit. They conclude that lines of credit are optimal when systemic risk is low, and thus banks are able to commit to providing lines of credit, whereas in periods of high systemic risk, banks may need to cut credit lines, and thus holding cash is optimal. They find that during financial macroeconomic stress periods, companies that are more sensitive to a downturn in the banking sector start to depart from bank-managed liquidity insurance (bank loans and lines of credit) to go to self-insurance (cash holding), not only because the demand of credit shrinks but also as the banks cannot guarantee the future liquidity for the enterprise.

Also relating to this literature, Ivashina and Scharfstein (2010) studied how the crisis of 2008 impacted the supply of credit to companies since during this period occurred a bank liquidity panic. They computed the quarterly data of syndicated loans data during 2000 and 2008 and observed that the origination of new loans decreased 47% on the fourth quarter of 2008 (peak of the crisis). The motivation for this reduction in bank lending is twofold: first, some companies decided not to draw down more credit lines, as they cut the expansion strategy and other investments, and, second, a supply effect was observed, as some banks deliberately reduced their lending and cut credit lines to the corporate sector. This is problematic during a recession period (that was the case during 2008), because the crisis does not affect all banks uniformly. Therefore, since the access to bank credit is determined by long-term relationships, firms that related to illiquid banks found it difficult to switch lenders in order to maintain their own liquidity. In this scenario, firms with good access to credit supply (i.e., firms that related to banks that were less affected by the crisis) may have provided trade credit both as substitute to bank loans (for firms that related to illiquid banks) and as complement to bank loans, providing reliable information about the companies, which allowed them to enter into new relationships with liquid banks.

The paper from Campello et al. (2011) explores the liquidity management during the recent subprime financial crisis. Their survey (made in 2009) comprises a sample of 800 CFOs from North America, Europe and Asia. The paper shows that companies usually do not use credit lines when they have enough internal funds, even though these firms could have access to the loans at a lower cost. Furthermore, there is evidence of an interaction between internal liquidity, credit lines and investment spending: the companies that have more cash then they need can intensify their investments if the available credit lines increase, and there is a tradeoff between cash saving and investment spending when firms cannot access credit lines.

Since Europe has an economy where bank credit lines are particularly relevant for liquidity management and corporate investment, Campello et al. (2012) analyze the impact of the 2008/2009 financial crisis in Europe and concluded that banks maintained the amount of their credit lines available to the firms during the crisis, and adjusted their interest rates to compensate for higher expected delinquency rates (because credit quality usually gets worse periods of crisis). The authors believe that their results support the argument that credit lines provide insurance in countries where there are more liquidity shortages among the industry.

2.3 Trade Credit in Crisis Periods

Choi and Kim (2005) tracked the trade credit response of firms to a monetary tightening in the U.S. (they call it a natural experiment, since they consider that the monetary tightening was unexpected and exogenous to the firms). They find that the usage of trade credit is increased during a tight monetary policy period, and that this effect is more pronounced for smaller companies, suggesting that macro-financial shocks stimulate the trade credit financing, with a possibility of redistribution effect, i.e. the optimal credit channels are changed according to the monetary policy.

This phenomenon is also observed in emerging economies. Love, Preve and Sarria-Allende (2007) study how the trade credit is affected in a sample of six emerging markets (Mexico, Indonesia, Korea, Malaysia, the Philippines and Thailand) influenced by two 1990s financial crisis: the Mexican devaluation ("Tequila Crisis") in 1994 and the Southeast Asia crisis in 1997. The amount of receivables form clients immediately increased during the peak of financial crisis periods, which could be either caused by: i) the accumulation of unpaid credit

given to clients or; ii) trade credit functioning as a substitute and complement to bank loans, given the limited capacity of banks to grant loans. However, they also find that the amount of trade credit provided decreases after the crisis period and continues to contract for several years, an evidence of the restricted capacity of suppliers to continue providing trade credit since they found themselves with less ability to raise external funding. As such, the redistribution of credit does not occur if the external financial sources do not supply enough funding (through capital markets or bank loans). In order words, if during the crisis a big financial contraction occurs and impacts even the large corporations, these natural suppliers of trade credit will not have enough liquidity to redistribute funds and the trade credit supply will contract. Thus, their evidence suggests that a shock that causes the banking sector to contract will translate into a reduction of trade credit.

Looking again at the emerging markets case, Santos, Sheng and Bortoluzzo,(2011) studied the effect of the 2008/2009 financial crisis in Latin American countries and found evidence that Latin American firms substitute the bank loans for trade credit during tightening periods, although big Brazilian and Mexican companies do not finance themselves with trade credit during monetary contraction, these firms continue to obtain external funding through the local or foreign capital markets, and are thus better able to maintain their internal liquidity as compared to smaller firms. Large firms have increased their short-term liabilities during this period.

Yang (2011) extended the earlier research of Love, Preve and Sarria-Allende (2007) to understand the relation between trade credit and bank credit during the recent subprime financial crisis in the U.S. manufacturing companies. Financially constrained firms are more likely to be negatively disturbed by the crisis, so they are more likely to cut credit supply and increase the trade credit usage. The results imply: i) a substitution effect for trade credit: bank loans are negatively related to the accounts payable and; ii) a redistribution effect of trade credit on the supply side i.e., if the bank loans increase at the firm level, the accounts receivable also increase.

3. STATEMENT OF HYPOTHESES AND METHODOLOGY

This study exploits two different types of crises (a banking crisis and a sovereign crisis) to investigate the relationship between trade credit and bank loans. Its identification strategy uses a multi-country setting, which allows the disentangling between supply and demand-side effects of shocks to the banking system on trade credit, by studying countries that were differently affected by the recent subprime and Euro crisis. Based on the literature presented on the previous section, three hypotheses are tested under this multi-country setting.

3.1 Trade Credit Hypotheses

Substitution Hypothesis: Trade credit supplied by corporations is a substitute to bank loans during financial crises.

During a banking crisis, fewer bank loans are offered to the industry. Hence, the firms demand more of other credit forms, as the trade credit, and seeing the possibility to profit from excess of liquidity, some corporations less affected by the crisis supply more trade credit to meet this unusual high demand and invest the additional cash on their customers. Accordingly, countries where the firms suffered more from credit tightness should also have demanded and supplied more trade credit to guarantee a reasonable level of capital to all supply chain participants, so the industry could continue to produce.

Complementary Hypothesis: The firms have more information about their clients than third part financial organizations, because they need to monitor, visit and have a close relationship. Thus the suppliers can distinguish better which customers have better creditworthiness, especially during panic periods where it is difficult for banks to find updated reliable data. Consequently, the companies will supply trade credit to their customer if they believe that it is a healthy company, and some banks can use this information to decide if they also should lend to those firms. So, while there is a financial crisis, some organizations will supply more trade credit to important clients and the later will use it to have this "supplier rating", this movement will be seen in countries which their firms are having more difficulties to access regular loans.

Transmission Hypothesis: During a financial crisis, large firms will supply more trade credit. In order to supply trade credit, the company should have enough liquidity and it can be obtained on the firm's cash or through credit loans. Usually, bigger organizations have more access to bank loans and capital markets, since there is more information about the company on the market, it is more difficult to them go bankrupt and they can access the credit markets from other countries. Hence, during a financial crisis, large organizations have credit loans that can result in an excess of capital, moreover independently of the country analyzed, probably the larger the company, the more trade credit it will supply if the demand goes higher.

Reflecting about the substitution and complementary hypotheses, during crisis periods the more impacted is the economy, the more trade credit is demanded and consequently the supply will grow as well. On our multi-countries scenario, the expectation is that during the subprime crisis the European countries had more liquidity problems than Brazil had, so the effect of both financial crises (the global financial crisis of 2008 and the Euro debt crisis of 2011) on trade credit supply will be smaller for Brazilian publicly traded companies compared to the European firms. Moreover, on the case of the recent Euro crisis of 2011, Spanish and Italian companies probably supplied more trade credit than the other sample firms.

3.2 Methodology

As the study aims to test the hypotheses about the trade credit supply, we follow most of the literature that uses the accounts receivable as a proxy to amount of trade credit offered by the firms.

First, it is important to point out that the accounts receivable is the equilibrium amount resulting from supply and demand, because it reflects the tendency of the client to pay over time instead of paying upon purchase. In order to distinguish these effects, which are result of the equilibrium, the model should have considered information of supplier and its customer (PETERSEN AND RAJAN, 1997). Unfortunately, the information about the firms' clients is not available, so for this study (as in virtually all the financial literature about the topic). Even though, our inferences are helpful in interpreting trade credit theories.

One possible issue of using accounts receivable as a proxy for trade credit is that, for firms from sectors, such as retail and utilities, which typically do not sell to other companies, accounts receivable do not characterize trade credit, which could damage our inferences Following Schiozer and Brando (2011) we exclude firms from these sectors from our sample. Another problem using the accounts receivable is that exporter firms usually have terms of payment independent of the trade credit use. Yet, it was not possible to specify which companies of the sample would enter in this case, since it depends on the level of exports and this information was not available for all the firms.

Beyond the proxy usage, this study did not consider the possible differences by industry classification, because it was not the focus of the paper and the excess of information could disturb the model. Nevertheless, the author recognizes that firms from distinctive sectors can offer trade credit differently because of the nature of the business and these effects were not considered on the model. However, we do use fixed effects in some of the regression models, which naturally capture industry effects.

Regarding the multi-countries setting, the countries were divided in three clusters: (i) Brazil, as it is an emerging economy and behaved differently than the Europeans during the crisis; (ii) Italy and Spain, as they are still having monetary problems; and (iii) France, Germany and United Kingdom, as they are more economically stable than other European nations.

The segregation between the European countries is a good choice, especially when we look at the stock exchange indexes. The indexes from Italy and Spain (Figure 2) show that the firms from these countries are struggling due to the European crisis, and it is clear the difference of performance when it is compared to the other indexes (Figure 1).
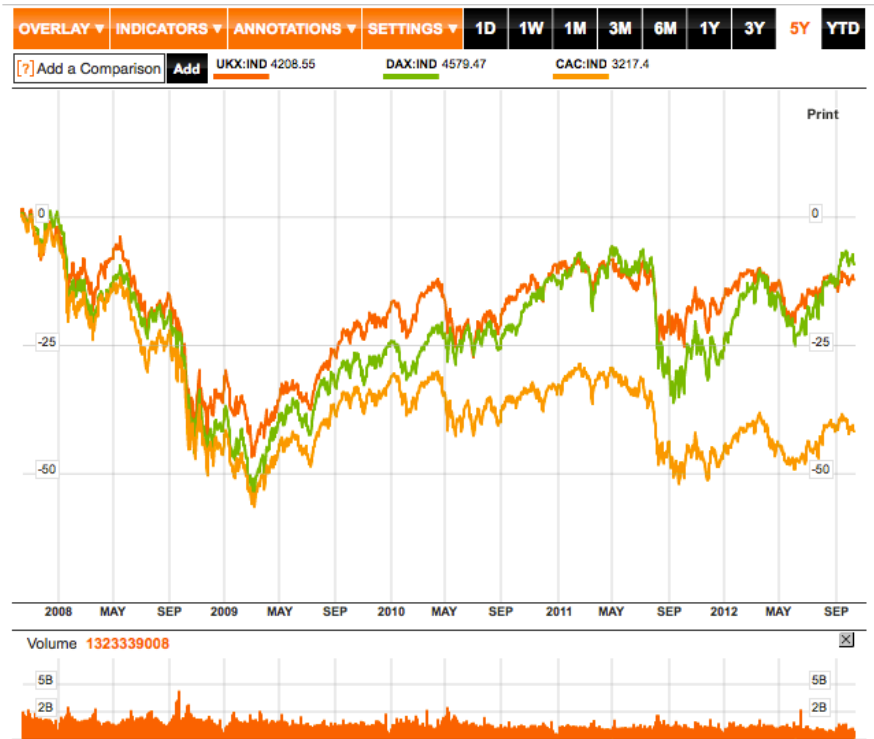
Figure 1. FTSE 100, CAC 40 and DAX Indexes

Source: BLOMBERG, 2012.
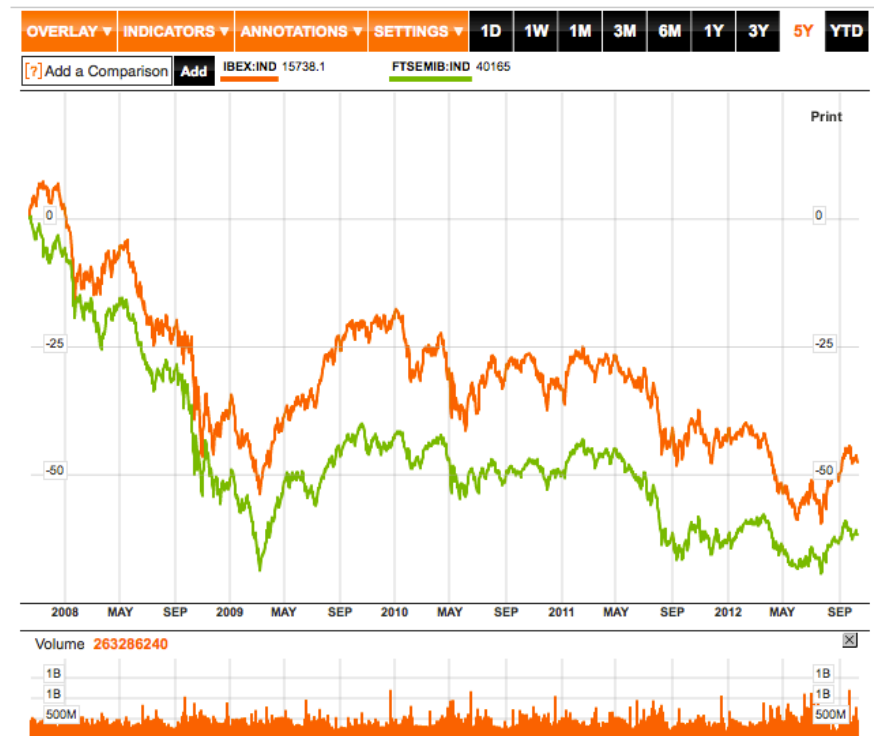
Figure 2. IBEX 35 and FTSE MIB Indexes

Source: BLOMBERG, 2012.

4. DATA ANALYSIS

The sample used in this study comprises 2,462 stock market listed companies in six countries: Brazil, France, Germany, Italy, Spain and United Kingdom. The table 1 shows the stock markets consulted and the number of firms of each country considered in the sample. The companies' information was taken from Bloomberg, annual data and related to the period from 2000 to 2011.

Table 1. Sample Composition

Country	Stock Market	Firms
Brazil	Bolsa de Valores de São Paulo (BOVESPA)	153
France	Euronext Paris	437
Germany	Frankfurter Wertpapierbörse (The Frankfurt Stock Exchange)	534
Italy	Borsa Italiana	148
Spain	Bolsa de Madrid	77
UK	London Stock Exchange	1,113

Source: BLOOMBERG, 2012. Developed by the author.

Moreover, before the database analysis, some figures from the International Monetary Fund (IMF) were consulted to analyze how was the behavior of the bank credit supply during the last years to foresee if the demand for credit was also affected. The databases consulted were the World Economic Outlook Database with data from 2000 to 2011, the Financial Access Survey (FAS) with statistics from 2004 to 2010 and the International Financial Statistics Public (IFS), with figures from 2008 to second quarter of 2012.

4.1 Credit Markets During Financial Crisis

Table 2 shows that the European countries have a much higher credit/GDP ratio than Brazil. Among other reasons, this occurs because the latter one has a history of high interest rates and inflation that made loans unfeasible for many years. Nowadays the interest rates on commercial and industrial bank loans are going down, but they are still higher if compared to other nations. Brazilian households and companies are also not used to have an environment with broad credit access. Ergo, the figures confirm that outstanding loans in France, Germany, Italy, Spain and UK have historically a higher participation on the GDP than in Brazil, although there is evidence that the financial crisis has impacted more the developed nations, as the emerging market is the only country on Table 2 that could maintain the same level of

annual change during the period 2008-2010, moreover most of the Europeans displayed a decrease of the loans participation on the GDP.

Table 2. Comparative Overall Outstanding Loans (% GDP)

	2004	2005	2006	2007	2008	2009	2010
Brazil	21.41	23.54	25.72	28.84	31.76	35.44	38.98
Δ Annual (%)	-	*9.9*	*9.3*	*12.1*	*10.1*	*11.6*	*10.0*
France	77.82	83.93	89.35	98.11	102.04	103.34	108.49
Δ Annual (%)	-	*7.9*	*6.5*	*9.8*	*4.0*	*1.3*	*5.0*
Germany	102.75	101.49	98.72	95.26	96.25	98.15	94.97
Δ Annual (%)	-	*-1.2*	*-2.7*	*-3.5*	*1.0*	*2.0*	*-3.2*
Italy	79.63	83.38	89.06	98.04	102.68	107.13	113.05
Δ Annual (%)	-	*4.7*	*6.8*	*10.1*	*4.7*	*4.3*	*5.5*
Spain	110.10	130.56	151.18	164.08	167.79	169.18	166.23
Δ Annual (%)	-	*18.6*	*15.8*	*8.5*	*2.3*	*0.8*	*-1.7*
UK	372.79	414.85	442.14	480.05	551.01	512.90	484.60
Δ Annual (%)	-	*11.3*	*6.6*	*8.6*	*14.8*	*-6.9*	*-5.5*

Source: IMF, 2012a.

As noted before, the total credit in Brazil has increased significantly from 2004 to 2010. According to the data from the IMF (2012), the overall outstanding credit represented 21.41% of GDP 2004 and reached the 38.98 in 2010 (an average annual increase of 10.5%, even considering that the Brazilian nominal GDP grew more than 50% during this period). One explanation for the low level of loans and the greater access of credit in Brazil is the decline of interest rates, particularly during the last year the government has motivated the Brazilian Central Bank to cut the Selic target rate – from 12% per annum on September 2010 to 7.5% two years later – in order to push down the commercial banks lending rates.

On the other hand, the Table 1 illustrates that European countries indicate an inverse movement, most of them presented a negative annual change of credit participation on the GDP and these countries did not increased their GDPs at the same rate as the emerging markets, revealing a real contraction of the credit. Inside this group, it is possible to see different cases: (i) France and Italy shrunk the amount of loans during 2008 and 2009 but increased again in 2010; (ii) Spain and UK kept the negative trend during the last years; (iii) Germany was decreasing the credit per GDP, slightly rose it during the subprime crisis and returned to the cycle of negative annual change rate.

This diversity of actions is caused by the chaos left by the subprime crisis that formed the current European credit crisis. To decide which are the most affect countries, Table 3 aggregates the interest rate of the European Government Bonds, where the trend was negative and suddenly the European governments started to increase the interest rate to raise more money. This movement is more visible in Italy and Spain, which are having more difficulties to place their bonds on the market. Conversely, Germany and UK have had more demand for their Government bonds during the crisis so they continue to cut the bonds' interest rates.

Table 3. Interest Rate: European Government Bonds (% per annum)

	2008	**2009**	**2010**	**2011**
Brazil	13.68	9.70	10.93	11.66
Δ Annual *(%)*	-	*-29.1*	*12.7*	*6.7*
France	4.23	3.65	3.12	3.32
Δ Annual *(%)*	-	*-13.8*	*-14.6*	*6.5*
Germany	3.98	3.22	2.74	2.61
Δ Annual *(%)*	-	*-19.1*	*-14.9*	*-5.0*
Italy	4.68	4.31	4.04	5.42
Δ Annual *(%)*	-	*-7.9*	*-6.4*	*34.4*
Spain	4.37	3.98	4.25	5.44
Δ Annual *(%)*	-	*-8.9*	*6.8*	*28.0*
UK	4.58	3.65	3.61	3.12
Δ Annual *(%)*	-	*-20.4*	*-1.0*	*-13.6*

Source: IMF, 2012b.

To sum up, it is possible to conclude that there was a credit contraction in the period that followed the 2008 Global Financial Crisis, which did not affect all the nations likewise. This phenomenon is clearly observed with the decrease of the loans growth rate during 2008 in most of countries analysed (see Table 2). However, European loans increased at a slower pace after the subprime crisis and did not recover to the previous levels in the following year, showing that the loan supply is highly affected by the current European crisis.

Also, in 2011, when the effects of the global financial crisis was downplayed for some countries that could quickly recover from the depression (as it was the case of most emerging markets), some countries such as Italy and Spain began to suffer from a sovereign debt crisis, as shown by the rates charged on government bonds in Table 3.

4.2 Data and Summary Statistic

In order to include just the relevant companies for the study, it was used the industry classification from Dow Jones and FTSE, the Industry Classification Benchmark (ICB). The listed firms from six different ICB sectors - Basic Materials, Consumer Goods, Health Care, Industrials, Oil & Gas and Technology - were considered in the sample. The decision to cut four ICB industries (Consumer Services, Financials, Telecommunication and Utilities) was taken because the firms that compose these sectors do not offer trade credit to their clients, since they usually sell directly to the final consumer or they already have long-term contracts with fixed prices.

Moreover, only firms with data of at least three consecutive years entered in the sample, leading to an unbalanced database of 2,462 corporations from the 6 stock markets' countries, the break of the composition is: 6.2% Brazil, 17.7% France, 21.7% Germany, 3.1% Spain and 45.2% UK. We convert all the balance sheet data to US dollars in order to make financial figures comparable and used nominal values to disregard the period's inflation in each country. This is not an issue for the estimation of our econometric models, since all the variables used are financial ratios, with the exception of our proxy for size.

Table 4. Statistical Analysis: Brazil, France and Germany

Country	Year	Total Assets (USD Million)			Working Capital (USD Million)			Total Debt (USD Million)			Revenue (USD Million)			EBIT (USD Million)			Profits (USD Million)			Gross Margin (%)			Net Margin (%)			Accounts Receivable / Total Assets (%)			Accounts Payable / Total Assets (%)		
		Average	Median	Standard Deviation	Average	Median	Standard Deviation	Average	Median	Standard Deviation	Average	Median	Standard Deviation	Average	Median	Standard Deviation	Average	Median	Standard Deviation	Average	Median	Standard Deviation	Average	Median	Standard Deviation	Average	Median	Standard Deviation	Average	Median	Standard Deviation
Brazil	2011	6,304	716	29,999	509	94	1,212	1,259	217	3,304	3,148	452	11,993	418	43	2,115	423	20	2,334	1.26	1.24	0.92	0.01	0.05	0.03	13.3	11.0	11.5	6.9	4.4	9.2
	2010	4,328	497	19,295	486	73	1,616	1,321	125	5,508	2,026	296	8,384	310	17	1,973	241	16	1,472	1.08	1.11	0.94	0.00	0.05	0.03	14.3	12.4	11.7	6.8	4.2	6.9
	2009	2,902	340	12,673	352	40	1,519	889	80	3,072	2,392	289	10,816	484	21	2,571	323	7	2,131	1.01	1.00	0.98	-0.02	0.04	0.03	13.5	10.8	11.0	7.3	4.7	7.9
	2008	2,801	352	12,723	279	56	774	785	72	2,748	1,774	216	8,002	366	10	2,120	249	5	1,480	1.02	0.97	0.93	-0.01	0.04	0.03	15.0	14.4	11.5	7.2	4.9	7.0
	2007	2,152	238	9,942	298	46	1,044	688	57	2,802	1,367	166	6,449	310	9	1,890	197	8	1,220	1.16	1.17	0.91	0.00	0.04	0.03	16.4	14.5	12.7	7.6	5.4	8.2
	2006	1,715	182	7,649	232	28	854	506	35	2,115	1,200	161	5,405	301	11	1,652	187	6	1,054	1.11	1.21	0.97	0.00	0.05	0.03	17.4	15.1	13.3	8.0	5.8	6.7
	2005	1,155	181	3,135	129	21	434	340	41	878	753	126	1,849	179	12	548	103	7	359	1.32	1.36	1.01	0.02	0.06	0.02	17.5	15.6	12.6	7.9	5.9	6.3
	2004	901	121	2,394	69	15	241	351	28	890	568	102	1,407	116	8	369	69	4	262	1.15	1.09	1.04	0.01	0.05	0.03	16.8	15.0	13.1	6.9	5.2	5.5
	2003	768	97	1,978	-12	5	502	282	20	707	677	97	2,113	109	10	277	-30	1	617	0.95	0.81	1.32	-0.03	0.02	0.03	16.6	14.8	12.2	8.0	5.8	7.2
	2002	1,066	135	3,746	100	12	575	368	24	1,096	683	105	2,679	128	11	532	83	2	470	1.24	1.18	1.22	0.01	0.04	0.02	16.2	14.3	12.5	7.0	5.8	6.2
	2001	1,122	153	4,005	92	16	273	371	29	1,165	771	127	2,981	160	12	797	113	7	600	1.27	1.24	1.17	0.02	0.04	0.02	15.6	12.8	11.9	7.2	5.3	6.3
France	2011	625	35	3,524	42	4.9	333	151	4.7	785	395	25	2,247	-0.2	0.1	31	-11	-1.1	40	1.51	1.53	0.98	0.02	0.04	0.01	24.9	23.1	16.8	18.3	14.4	13.8
	2010	646	39	3,612	59	5.5	388	154	4.5	767	396	25	2,270	-0.6	-0.3	48	-16	-0.6	75	1.43	1.47	1.00	0.00	0.03	0.02	24.9	22.0	17.3	17.8	13.7	14.2
	2009	676	37	3,824	45	4.7	364	159	4.8	775	461	24	2,553	15.9	0.1	119	-47	0.1	631	1.39	1.48	0.87	0.00	0.03	0.02	26.2	24.1	18.8	18.5	14.6	14.9
	2008	777	40	4,658	67	6.3	353	167	4.5	853	443	29	2,447	14.1	1.1	134	13	0.5	557	1.52	1.55	0.68	0.03	0.04	0.01	26.6	24.4	17.3	19.3	14.4	15.7
	2007	718	30	4,868	-10	4.5	1,126	202	4.2	1,276	331	25	1,677	23.7	0.8	117	4	0.4	56	1.48	1.53	0.69	0.03	0.04	0.01	27.7	26.8	17.2	20.8	17.0	14.8
	2006	435	31	2,613	46	5.4	243	84	2.7	449	345	28	1,815	21.7	0.7	147	13	0.4	109	1.46	1.53	0.63	0.02	0.04	0.01	29.1	27.0	17.5	21.5	17.9	14.8
	2005	505	32	3,037	98	6.4	641	85	2.6	548	342	31	1,776	16.0	0.7	89	7	0.4	40	1.47	1.54	0.70	0.01	0.03	0.01	29.3	26.8	16.9	20.5	16.5	14.5
	2004	537	30	3,259	89	5.2	670	112	3.7	674	330	28	1,721	1.0	0.4	48	-21	0.1	206	1.45	1.54	0.83	0.00	0.02	0.02	28.7	25.6	17.2	19.3	16.1	13.7
	2003	516	29	3,136	82	5.4	629	106	3.9	614	328	29	1,778	-7.7	0.4	121	-42	0.2	426	1.45	1.54	0.87	-0.01	0.02	0.02	30.0	28.6	17.4	18.9	16.0	12.5
	2002	552	25	3,523	98	5.3	779	121	4.0	726	391	35	2,344	-13.3	0.5	200	-44	0.1	429	1.50	1.60	0.89	0.00	0.03	0.01	30.3	29.5	16.5	19.8	17.0	13.7
	2001	650	28	4,306	100	6.0	865	125	4.3	756	460	31	2,977	22.3	0.6	159	14	0.3	124	1.57	1.65	0.65	0.01	0.03	0.01	30.4	29.3	16.4	19.3	16.6	13.2
Germany	2011	702	56	4,979	92	3.8	746	165	19	829	730	50	5,129	-17	-2.7	80	-39	-7.0	173	1.16	1.13	0.78	-0.02	0.03	0.03	16.0	15.0	11.3	12.3	9.3	11.0
	2010	719	59	5,036	67	5.8	529	174	16	924	726	47	4,905	-5	-2.8	149	-19	-4.9	97	1.12	1.12	0.77	-0.04	0.01	0.03	15.0	13.0	11.4	10.8	8.3	10.1
	2009	743	68	5,116	98	7.1	696	173	17	990	827	58	4,844	-10	-1.6	247	-27	-4.0	230	1.14	1.12	0.69	-0.03	0.02	0.03	15.7	13.7	12.0	11.2	8.7	10.4
	2008	758	84	4,965	124	11.6	727	136	17	579	930	55	6,750	55	-0.4	454	31	-1.7	295	1.12	1.15	0.69	-0.01	0.03	0.02	16.2	14.3	11.6	11.1	8.3	10.3
	2007	660	73	4,586	127	9.8	846	111	15	485	798	50	5,813	51	0.2	422	34	-0.6	283	1.05	1.05	0.70	-0.01	0.03	0.02	17.1	16.0	12.2	10.8	8.6	8.5
	2006	604	60	4,025	109	6.6	762	105	12	470	752	50	5,160	42	0.0	356	23	-0.4	202	1.08	1.08	0.78	-0.01	0.02	0.02	17.8	17.0	12.5	10.8	8.4	10.1
	2005	640	71	4,064	148	7.1	1,131	141	13	776	771	67	4,987	29	0.6	238	12	-0.8	124	1.07	1.05	0.81	-0.02	0.01	0.02	18.1	17.8	12.1	10.8	9.1	8.4
	2004	615	56	3,739	97	6.1	770	134	11	624	723	56	4,578	18	-0.3	223	-5	-2.2	133	1.07	1.02	0.86	-0.05	0.00	0.03	19.0	18.4	11.8	11.1	8.4	9.8
	2003	580	60	3,433	60	5.8	389	123	12	598	628	54	3,728	12	-0.4	117	-2	-2.9	63	1.02	0.98	0.79	-0.07	0.00	0.03	18.4	17.6	11.3	9.5	8.0	7.6
	2002	520	58	2,992	60	5.9	363	120	10	574	587	57	3,286	10	-0.8	89	-4	-2.1	38	1.04	1.02	0.77	-0.07	0.01	0.03	18.5	18.4	10.8	9.6	8.4	7.0
	2001	540	61	3,099	77	13.4	469	132	13	721	618	42	3,342	15	0.3	99	7	-0.9	68	1.36	1.30	0.88	-0.03	0.02	0.02	18.8	18.7	11.3	8.8	8.1	5.5

Source: BLOOMBERG, 2012. Developed by the author.

Table 5. Statistical Analysis: Italy, Spain and United Kingdom

Country	Year	Total Assets (USD Million)			Working Capital (USD Million)			Total Debt (USD Million)			Revenue (USD Million)			EBIT (USD Million)			Profits (USD Million)			Gross Margin (%)			Net Margin (%)			Accounts Receivable / Total Assets (%)			Accounts Payable / Total Assets (%)		
		Average	Median	Standard Deviation	Average	Median	Standard Deviation	Average	Median	Standard Deviation	Average	Median	Standard Deviation	Average	Median	Standard Deviation	Average	Median	Standard Deviation	Average	Median	Standard Deviation	Average	Median	Standard Deviation	Average	Median	Standard Deviation	Average	Median	Standard Deviation
Italy	2011	3,975	404	17,252	277	23	1,520	1,082	123	4,163	2,538	269	11,726	259	14.3	1,787	104	2.6	708	1.26	1.30	0.98	-0.01	0.01	0.01	21.3	20.3	13.2	18.3	16.6	14.0
	2010	3,874	435	16,551	276	25	1,485	1,177	133	4,750	2,517	271	11,367	226	8.1	1,416	78	2.3	536	1.22	1.21	0.83	-0.02	0.01	0.02	21.6	20.1	13.2	16.8	14.8	10.4
	2009	3,689	412	15,657	191	28	910	1,035	107	3,828	3,140	345	15,046	336	21.1	2,301	158	7.0	1,100	1.26	1.36	0.85	0.00	0.03	0.02	22.8	20.8	13.4	17.8	15.7	10.4
	2008	3,632	444	14,709	295	43	1,251	981	104	3,547	2,709	316	12,051	345	22.3	2,181	181	12.8	1,162	1.46	1.53	0.67	0.03	0.04	0.01	24.1	23.6	13.9	19.1	17.9	11.2
	2007	3,058	417	12,148	299	47	1,364	796	75	2,875	2,327	262	10,683	302	20.2	2,055	139	9.7	994	1.48	1.62	0.82	0.04	0.04	0.01	24.5	23.1	13.8	18.2	17.0	10.4
	2006	3,034	389	11,578	218	40	873	858	90	3,296	2,284	270	9,913	287	20.3	1,914	157	8.2	1,009	1.41	1.42	0.83	0.03	0.03	0.01	23.2	21.5	14.4	17.4	15.4	11.3
	2005	3,542	414	12,618	309	61	1,176	990	89	3,234	2,496	333	10,848	249	20.2	1,587	110	5.2	918	1.39	1.41	1.02	0.01	0.02	0.01	24.1	21.8	14.3	17.0	14.9	11.4
	2004	3,338	400	12,168	348	52	1,690	1,017	93	3,648	2,014	291	8,086	185	11.7	1,110	61	2.6	680	1.36	1.24	1.10	-0.01	0.01	0.01	23.1	21.8	13.9	15.9	14.9	10.2
	2003	3,170	323	12,510	309	44	1,759	964	88	3,733	1,716	229	7,118	135	9.1	845	21	3.1	600	1.12	1.06	1.04	0.01	0.02	0.01	22.9	21.6	14.6	15.2	13.9	9.7
	2002	2,672	257	11,106	209	36	980	765	78	3,346	1,626	206	7,021	154	13.3	978	78	3.9	744	1.21	1.23	1.07	0.02	0.03	0.02	22.0	21.9	14.4	15.1	13.5	9.8
	2001	2,773	255	11,250	249	36	785	793	67	3,500	1,718	178	7,340	177	10.4	1,072	105	4.6	587	1.28	1.51	1.03	0.03	0.03	0.01	22.3	22.2	13.6	16.1	13.6	10.8
Spain	2011	5,934	917	14,733	87	25	1,341	2,354	218	6,043	2,931	592	8,930	334	27.6	1,280	215	17.1	822	1.32	1.27	0.85	0.02	0.04	0.01	16.7	12.7	11.9	15.2	12.5	11.9
	2010	5,800	925	14,402	39	30	682	2,486	176	6,634	2,839	569	8,217	211	14.9	623	134	8.4	479	1.27	1.17	0.78	-0.01	0.02	0.02	16.9	13.4	12.6	15.2	12.4	12.7
	2009	5,567	942	14,081	-230	25	2,979	2,161	220	5,632	3,158	637	10,473	292	41.7	942	147	15.6	578	1.33	1.28	0.79	0.03	0.04	0.01	18.2	14.9	13.2	16.9	13.9	13.5
	2008	5,543	881	14,253	138	46	988	2,346	165	6,563	2,819	527	9,056	336	70.0	1,031	204	32.3	597	1.22	1.21	0.57	0.07	0.06	0.01	20.3	17.2	13.4	18.0	14.3	13.7
	2007	3,957	695	9,888	133	33	739	1,657	120	4,536	2,176	377	7,749	257	35.0	894	175	22.6	529	1.20	1.32	0.68	0.06	0.06	0.01	20.3	18.9	12.7	18.1	14.9	14.5
	2006	2,674	541	7,369	103	28	531	879	100	2,303	1,948	318	7,323	227	28.0	924	129	21.1	476	1.12	1.25	0.57	0.06	0.06	0.01	20.2	16.1	13.4	17.0	13.7	13.1
	2005	2,768	484	7,433	244	33	773	894	122	2,341	1,790	241	6,445	189	15.9	687	109	14.1	321	1.28	1.18	0.71	0.07	0.06	0.00	22.8	19.9	14.2	16.1	13.2	12.0
	2004	2,449	451	6,657	105	30	460	767	101	2,151	1,507	239	5,265	149	15.9	534	120	9.9	396	1.22	1.22	0.71	0.06	0.06	0.00	21.6	16.9	13.9	15.1	13.2	11.4
	2003	1,604	363	5,170	81	26	354	496	89	1,694	1,123	207	4,273	101	16.9	365	59	11.9	241	1.25	1.17	0.77	0.05	0.05	0.01	21.5	17.0	14.5	16.2	13.4	11.4
	2002	1,478	294	5,827	40	28	170	490	74	2,374	1,146	254	4,880	120	18.2	559	41	12.0	124	1.32	1.28	0.76	0.04	0.05	0.01	21.7	18.9	12.5	16.4	12.4	12.0
	2001	1,524	315	6,349	33	35	379	505	50	2,667	1,185	243	5,244	147	16.9	710	68	11.7	289	1.35	1.35	0.73	0.07	0.06	0.00	22.5	18.1	12.9	17.1	12.7	12.6
UK	2011	3,675	82	21,826	-154	3.9	1,777	1,216	18	6,290	2,323	59	11,174	243	1.9	1,244	178	1.2	1,188	1.22	1.24	0.77	-0.02	0.03	0.04	16.0	10.8	17.4	11.6	7.8	12.4
	2010	3,463	77	21,067	-155	4.5	2,068	1,181	17	5,908	2,178	51	10,658	223	1.4	1,211	162	0.7	1,245	1.23	1.26	0.84	-0.04	0.02	0.04	15.6	10.7	16.6	12.3	7.6	20.8
	2009	3,278	71	19,326	-170	3.9	1,998	1,175	22	5,806	2,296	66	11,085	250	1.8	1,373	90	0.5	878	1.09	1.10	0.96	-0.07	0.01	0.04	16.7	13.0	17.9	12.4	7.0	15.2
	2008	3,757	112	22,253	-181	5.8	2,526	1,132	17	5,505	2,421	81	11,150	278	4.1	1,460	206	2.1	1,261	1.25	1.27	0.70	-0.03	0.04	0.04	18.2	14.4	18.1	11.2	7.8	12.1
	2007	3,592	104	19,811	-140	5.6	1,472	1,029	22	4,740	2,205	65	9,850	280	3.9	1,410	37	2.8	1,089	1.26	1.26	0.68	-0.03	0.04	0.04	18.0	15.6	17.3	12.4	8.8	15.1
	2006	3,314	72	21,097	-170	5.6	1,902	939	11	4,296	2,081	65	9,407	263	3.8	1,399	-240	2.1	3,661	1.26	1.25	0.70	-0.02	0.04	0.04	20.7	18.1	18.1	13.7	10.1	17.4
	2005	3,740	65	24,721	-153	5.8	1,530	659	17	2,358	1,944	63	8,562	56	2.6	1,184	-57	1.4	1,375	1.30	1.29	0.71	-0.02	0.03	0.03	21.5	16.2	19.8	16.0	10.2	28.3
	2004	4,230	82	28,135	-77	6.3	924	902	12	3,559	1,958	65	8,423	51	3.5	932	-98	1.0	1,601	1.30	1.31	0.81	-0.02	0.03	0.03	20.2	16.0	19.5	13.6	9.8	15.6
	2003	3,586	55	26,979	-110	4.3	1,099	645	8	2,888	1,301	41	6,427	-22	1.7	826	-142	0.2	1,594	1.25	1.28	0.77	-0.05	0.02	0.04	18.7	17.0	15.4	13.7	9.6	17.8
	2002	3,565	50	24,294	-160	3.3	1,062	740	8	3,349	1,495	45	6,688	13	1.4	1,043	-212	0.0	2,388	1.22	1.27	0.88	-0.05	0.02	0.04	17.7	16.6	15.9	12.4	8.5	14.3
	2001	3,894	54	26,175	-71	4.8	1,372	824	7	3,920	1,351	34	6,058	0.3	2.0	1,124	-119	1.0	1,528	1.28	1.32	0.75	-0.03	0.04	0.04	19.0	16.0	17.6	12.9	9.4	14.1

Source: BLOOMBERG, 2012. Developed by the author.

In order to understand better the data series that will be used, a descriptive statistics analysis was made to each country (see Table 4 and Table 5). Looking at the statistical analysis, it is possible to notice that there is evidence that majority of the countries have a high variance regarding firm size. Moreover, the sample is asymmetric to the right for all countries data group, as each one indicates a wide difference between the average and the median.

In general, the total assets, the revenue and total debt of the companies have increased during the period studied in all countries showing that the industry has grown. However, in countries like Brazil, Spain and Italy this evolution is more evident; moreover Brazil presented a higher growth rate than any of the other countries, which is consistent with both: i) the high economy development that the BRIC nations experimented during the last years and ii) the appreciation of the Brazilian Real. The figures for the European companies reflect the depreciation of the Euro and the British pound along the sample period. For example the average total assets in Italy was USD 2.8 billion in 2001 and became USD 4.0 billion eleven year later, while in Brazil the same averaged variable grew six times, coming from USD 1.1 billion to USD 6.3 in the same period.

It is also interesting to notice that some European countries indicated negative average EBIT and profits especially during the last three years, suggesting that the European industry is not in their best moment and its businesses may not be sustainable without an actively financial sector, although the total debt was just boosted significantly in Spain, Italy and UK.

The gross margin and the net margin variables presented a wide range of outliers, mainly negative values, because some firms had low level of revenue and/or profits. Hence, these variables went through a winsorization process (COX, 1998), which statically transformed the data setting out all the outliers out of the 90% confidence interval. As a result, the statistical analysis of the gross margin and net margin display a homogeneous set of variables that did not change much during the period studied, so the average applied margins by the industry of each country was almost the same on the last eleven years.

As a final point, the trade credit supply and demand were analyzed with the proxy variables: accounts receivable by total assets for former and accounts payable also by total assets for the later. From that study there is evidence that the sample firms supply more trade credit than they demand, as this event occurred in every country with a different degree, i.e. 16.0% of the

British firms' assets were receivables and 11.6% were payables, against respectively 13.3% and 6.9% of the Brazilian firms' assets or 24.9% and 18.3% of French firms' assets.

4.3 Model Specification and Variables Description

Based on literature review (Section 2) and methodology (Section 3) the models applied to find evidence of trade credit determinants that can test the hypotheses. It is important to note that all trade credit determinant variables used in this present study are based on the paper of Schiozer and Brando (2010). First, without segregation by countries groups, the Equation 1 announced the movements of trade credit supply considering commercial bank loans data (period of 2004 to 2011) and if the trade credit hypotheses were valid, afterward the aim was to see the same movement during negative GDP variation (crisis periods).

$$
\begin{aligned}
TRADE\_CREDIT_{i,t} \\
= \beta_0 + \beta_1 \log(SIZE)_{i,t} + \beta_2 DEBT_{i,t} + \beta_3 PAYABLES_{i,t} + \beta_4 CASH_{i,t-1} \\
+ \beta_5 INVENTORY_{i,t-1} + \beta_6 GROSS_{MG\,i,t} + \beta_7 (DEBT \times GROSS_{MG})_{i,t} \quad (1) \\
+ \beta_8 CREDIT\_BANK_{i,t} + \beta_9 dGDP_t + \beta_{10}(dGDP_t \times CREDIT\_BANK_{i,t}) \\
+ \varepsilon_{i,t}
\end{aligned}
$$

Where:

$TRADE\_CREDIT_{i,t}$: proxy variable to trade credit supply, it is the accounts receivable by the total assets of the firm i during the year t.

$SIZE_{i,t}$: total assets of the firm i during the year t.

$DEBT_{i,t}$: total debt (long-term debt and short-term debt) by the total assets of the firm i during the year t.

$PAYABLES_{i,t}$: accounts payable by the total assets of the firm i during the year t.

$CASH_{i,t-1}$: cash and liquid investments by the total assets of the firm i during the previous year $t-1$.

$INVENTORY_{i,t-1}$: inventories by the total assets of the firm i during the previous year $t-1$.

$GROSS\_MG_{i,t}$: gross margin calculated as the net revenue decreased costs of goods sold (COGS) and selling, general and administrative expenses (SG&A) by the total assets of the firm i during the year t.

$CREDIT\_BANK_{i,t}$: overall outstanding loans by GDP in the country of the firm i during the year t.

$dGDP_{i,t}$: dummy for negative GDP growth at the country level, assuming 1 when the change in real GDP is negative, and zero otherwise.

$\varepsilon_{i,t}$: error term.

Then, the following cross-country model (Equation 2) were built to test the trade credit supply considering the period 2001 to 2011 in different groups of countries: (i) Brazil, (ii) Italy and Spain, (iii) France, Germany and United Kingdom; and specially the trade credit movements during the two recent financial crisis: "global financial crisis" – 2008 data, as the global crisis timeline is from September 2008 to March 2009 (AIT-SAHALIA ET AL., 2012) and the figures are annual – and "European crisis" – 2011 data, as the government bond rates (see Table 3) show that the crisis started in 2011. Equation 2 was tested with Brazil as country reference and, alternatively for robust test with France, Germany and UK as reference.

$$
\begin{aligned}
TRADE_{CREDIT_{i,t}} \\
&= \beta_0 + \beta_1 \log(SIZE)_{i,t} + \beta_2 DEBT_{i,t} + \beta_3 PAYABLES_{i,t} + \beta_4 CASH_{i,t-1} \\
&+ \beta_5 INVENTORY_{i,t-1} + \beta_6 GROSS_{MG_{i,t}} + \beta_7 (DEBT \times GROSS_{MG})_{i,t} \\
&+ \beta_8 dIS_i + \beta_{10} dFGU_i + \beta_9 GFC_t + \beta_{11} EUR_t + \beta_{12}(dIS_i \times GFC_t) \\
&+ \beta_{13}(dFGU_i \times GFC_t) + \beta_{14}\left(\log(SIZE)_{i,t} \times GFC_t\right) + \beta_{15}(dIS_i \times EUR_t) \\
&+ \beta_{16}(dFGU_i \times EUR_t) + \beta_{17}\left(\log(SIZE)_{i,t} \times EUR_t\right) + d_t + \varepsilon_{i,t}
\end{aligned}
\tag{2}
$$

Where:

GFC_t : "global financial crisis" dummy for the year 2008 that capture all the macroeconomic variables that affected the firms.

EUR_t : "Euro crisis" dummy for the year 2011 that captures all the macroeconomic variables that affected the firms.

dBR_i : dummy for Brazil that capture all the macroeconomic variables that affected the Brazilian firms.

dIS_i : dummy for Italy and Spain that capture all the macroeconomic variables that affected the Italian and Spanish firms.

$dFGU_i$: dummy for France, Germany and UK that capture all the macroeconomic variables that affected the French, German and British firms.

d_t : time dummies.

$\varepsilon_{i,t}$: error term.

Two estimations process were applied on the models: (i) pooled OLS and (ii) fixed effects panel data. The pooled OLS was used to measure the effect of the different countries' groups on the trade credit supply, since the panel data captures this effect and it could not be individually analyzed. Moreover, given the nature of the figures (database composed of companies' information over the time) a panel data should be studied, so a Hausman test was exercised on the sample and rejected the evidence of random effects, consequently the fixed effects estimation was chosen to be applied, all results are presented on the next section.

5. EMPIRICAL ANALYSIS

Table 6 indicates the results of Equation 1 using pooled OLS and fixed effects panel data methods, in order to analyze the behavior of trade credit supply – account receivables as proxy – during periods of GDP retraction.

Table 6. Trade Credit Supply During GDP Contraction

This table reports the coefficients of the trade credit supply using the proxy accounts receivable by total assets ratio of each firm on the sample estimated using pooled OLS (with and without trade credit supply lagged as independent variable) and fixed effects data panel. The independent variables of the Equation 1 were described on the section 4.3.

Variable	Expected Signal	Pooled OLS		Fixed Effects
		I	II	
Constant		0.1991***	0.0425***	0.3039***
		(0.009)	(0.005)	(0.022)
TRADE_CREDIT (t-1)	+		0.8388***	
			(0.010)	
log (SIZE)	+	-0.0102***	-0.0023***	-0.0231***
		(0.001)	(0.000)	(0.004)
DEBT	+	-0.0050	0.0038	-0.0132
		(0.008)	(0.003)	(0.008)
PAYABLES	+	0.4399***	0.4479***	0.1983***
		(0.048)	(0.017)	(0.054)
CASH (t-1)	+	0.0013***	-0.0055	-0.0001
		(0.000)	(0.004)	(0.000)
INVENTORY (t-1)	+	-0.0204***	-0.0271***	0.0018
		(0.006)	(0.005)	(0.005)
GROSS_MG	+	0.0200***	0.0037***	0.0037***
		(0.002)	(0.001)	(0.002)
DEBT*GROSS_MG	-	-0.0315***	-0.0060***	-0.0082
		(0.007)	(0.002)	(0.005)
CREDIT_BANK	+ / -	-0.0005***	-0.0003***	-0.0003***
		(0.000)	(0.000)	(0.000)
dGDP	-	-0.0548***	-0.0380***	-0.0397***
		(0.021)	(0.009)	(0.008)
dGDP*CREDIT_BANK	+ / -	0.0011***	0.0007***	0.0008***
		(0.000)	(0.000)	(0.000)
Number of obs.		14,868	12,299	14,868
F-test		76.60***	1857.37***	16.00***
R^2		0.2054	0.7932	0.8140

***, ** and * indicated the coefficient is significantly different from zero at 1%, 5% and 10% level respectively. The estimated robust standard errors are in parentheses.
On the case of loans (CREDIT_BANK) and loans during GDP contraction periods (dGDP*CREDIT_BANK), the signal will show the evidence of substitution hypothesis (if coefficient is negative) or complementary hypothesis (if coefficient is positive).

The two last specifications shown in Table 6 indicate that there is a substantial stability in trade credit supply through time, since the coefficient of the lagged dependent variable is highly significant and close to unity. As such, it is clear that specifications using pooled OLS II and fixed effects are better in explaining trade credit supply than specification using pooled OLS I.

From the results of Table 6, it is possible to observe that there is a transmission of trade credit from the liabilities to the asset side, as the accounts payable by total assets (PAYABLES) coefficient is positive and significant. It is of course plausible that causality occurs in the either direction (i.e., payables may affect receivables and vice-versa), but we are not particularly concerned with causality here.

Unlike the results found for US firms, size negatively affects the trade credit supply, in line with the results found for trade credit in Brazil [see Schiozer and Brando (2011) and Saito and Bandeira (2010)], which also presented the same outcome. Saito and Bandeira (2010) concluded that the size did not affect positively the trade credit because listed companies are so large that most of the time they are less dependent of their buyers, so they do not need to invest on their customer relationships providing them trade credit.

In analyzing the results for Debt, we also do not find evidence in favor of the substitution hypothesis (which implies that larger firms would have more access to capital market and transmit their funds to smaller, non-listed companies), since there is no statistical significance for this variable. Likewise, CASH showed significant positive coefficient only in specification (1).

The firms' profitability represented by the gross margin (GROSS_MG plus partial effect of GROSS_MG*DEBT) has proven to be approximately zero in all estimation methods, showing that there is no evidence that profitable companies are able to supply more trade credit (PETERSEN AND RAJAN, 1997).

Burkart and Ellingsen (2004) introduced the idea that, if DEBT is a proxy for debt capacity, we could expect that firms with simultaneously lower gross margins (i.e., less profitable) and higher debt capacity would supply trade credit to their clients as a form of boosting sales. This could be interpreted as product-disadvantaged firms in very competitive markets using their

debt capacity to increase sales. As such, the idea that firms with more access to funding provide trade credit to smaller clients may be restricted to firms operate in price-competitive markets. The equation results show that DEBT*GROSS_MG coefficient was negative and significant using pooled OLS, corroborating Burkart and Ellingsen's (2004) theory.

The inventories (INVENTORY) results also contradicts with the theory expectations, it was assumed that if firms have a large inventory, they will try to supply more trade credit in the following year to return inventories to optimal levels. However, using pooled OLS the INVENTORY appeared negative and significant. One possible interpretation is that firms with lower inventories are forced to reduce sales in the next period and hence supply less trade credit.

The results also show that decreasing bank loans at the country level (CREDIT_BANK) encourage the trade credit supply, in line with Alphonse, Ducret and Séverin (2006) conclusions. So there is evidence that the substitution hypothesis is valid, if the economy is suffering from credit tightness and the firms cannot easily reach bank loans, the industry will require other credit types like trade credit to finance their projects.

Regarding the crisis periods, as expected the results indicate that there is evidence of trade credit supply contraction during the years of negative GDP percent change, in other words the firms diminish the trade credit supplied as sales are reduced during an economic downturn.
However, there is evidence that when the GDP contracts and the bank loans increase (dGDP*CREDIT_BANK) the trade credit supply also rises as the coefficient is positive and significant. This intensification of trade credit supply supports the complementary hypothesis, that trade credit is demanded to grant a better access to bank loans because the banks have a lack of customers' information. Another possible interpretation is that both trade credit and bank loans may act as substitutes for long term debt, since capital markets typically contract during recessions.

Consequently, it is feasible to conclude that trade credit supply behaves differently during normal times and crisis periods. If we consider the whole period, the substitution hypothesis is more suitable, since there is evidence that trade credit is more supplied when bank loans shrink at the country level. This could be due to the fact that, when the banking system is able to provide loans, they may do it at lower rates as compared to suppliers (i.e., bank loans are

cheaper than trade credit). During crisis periods, however, trade credit seems to have another role, the complementary hypothesis appears to be stronger. There is indication that when the GDP decreases the trade credit supply and the bank loans go to the same direction, the more bank loan is offered the greater is the aggregate supply of trade credit. Hence this movement appears to be a complementary effect, in order to get new loan lines the firms use trade credit to prove creditworthiness as suppliers have more information about their customers than banks.

These results follow the same pattern of the Love, Preve and Sarria-Allende (2007) article, as during GDP contraction periods the sampled firms also seems to reduce the trade credit supply if there is not enough supply of bank loans, exactly the interesting post peak-crisis effect found by the authors while the emerging markets were trying to recover from financial crisis and still suffering from a weakened economy and a tight credit market.

Proven the evidence of trade credit peculiarities during crisis periods, it was used pooled OLS and fixed effects panel data on the Equation 2 and Equation 3 in order to analyze if the three different countries group (geographical dummy) – (i) dBR: Brazil; (ii) dIS: Italy and Spain; (iii) dFGU: France, Germany and United Kingdom – have distinctive or similar behaviors regarding the trade credit supply during normal and crisis periods, the coefficients' scores can be seen on table 7. As one country dummy must be the reference (collinearity issue), first it was chosen Brazil (dBR) as it is the country that had the best economic performance during and after the subprime crisis among the sample countries (Table 7, Equation 2); then France, Germany and UK (dFGU) were the reference as model robust test to measure the crisis impact on the most affected countries, Italy and Spain (dIS), against other European (Table 7, Equation 3).

The results shown in Table 7 indicate that our inferences regarding SIZE, DEBT, GROSS_MG and DEBT*GROSS_MG are unaffected by the inclusion of country dummies, time dummies and their interactions. The main difference is that the variable INVENTORY that turns out to be positive under the fixed effects estimation, becoming difficult to come to a valid conclusion.

Table 7. Trade Credit Supply Cross-Country Analysis

This table reports the coefficients of the trade credit supply using the proxy accounts receivable by total assets ratio of each firm on the sample estimated using pooled OLS (with and without trade credit supply lagged as independent variable) and fixed effects data panel. The independent variables of the Equation 2 and 3 were described on the section 4.3. Group I has Brazil (dBR) as country reference and Group II has France, Germany and UK (dFGU) as country reference.

Variable		Group I			Group II		
		Pooled OLS		Fixed Effects	Pooled OLS		Fixed Effects
		I	II		I	II	
Constant		0.1822***	0.0323***	0.2509***	0.1831***	0.0277***	0.2509***
		(0.008)	(0.004)	(0.022)	(0.008)	(0.003)	(0.022)
TRADE_CREDIT (t-1)	+		0.8445***			0.8445***	
			(0.008)			(0.008)	
log (SIZE)	+	-0.0102***	-0.0023***	-0.0161***	-0.0102***	-0.0023***	-0.0161***
		(0.001)	(0.000)	(0.004)	(0.001)	(0.000)	(0.004)
DEBT	+	-0.0054	0.0034	-0.0018	-0.0054	0.0034	-0.0018
		(0.008)	(0.003)	(0.010)	(0.008)	(0.003)	(0.010)
PAYABLES	+	0.4454***	0.1001***	0.2265***	0.4454***	0.1001***	0.2265***
		(0.041)	(0.013)	(0.050)	(0.041)	(0.013)	(0.050)
CASH (t-1)	+	0.0000	-0.0058	0.0000**	0.0000	-0.0058	0.0000
		(0.000)	(0.004)	(0.000)	(0.000)	(0.004)	(0.000)
INVENTORY (t-1)	+	0.0001***	-0.0221***	0.0001***	0.0001***	-0.0221***	0.0001***
		(0.000)	(0.005)	(0.000)	(0.000)	(0.005)	(0.000)
GROSS_MG	+	0.0201***	0.0033***	0.0026**	0.0201***	0.0033***	0.0026**
		(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
DEBT*GROSS_MG	-	-0.0339***	-0.0056***	-0.0014	-0.0339***	-0.0056***	-0.0014
		(0.006)	(0.002)	(0.004)	(0.006)	(0.002)	(0.004)
dBR	+				-0.0008	0.0047**	
					(0.005)	(0.002)	
dIS	+	0.0236***	-0.0018		0.0228***	0.0028*	
		(0.006)	(0.003)		(0.004)	(0.002)	
dFGU	+	0.0008	-0.0047**				
		(0.005)	(0.002)				
GFC	-	-0.0100	-0.0113	0.0005	-0.0079	-0.0007	0.0015
		(0.016)	(0.008)	(0.009)	(0.013)	(0.005)	(0.007)
EUR	-	-0.0212	-0.0149	-0.0036	-0.0271*	0.0006	-0.0108
		(0.019)	(0.010)	(0.013)	(0.014)	(0.008)	(0.010)
Number of obs.		19,228	16,422	19,228	19,228	16,422	19,228
F-test		62.96***	1,233.2***	18.52***	62.96***	1,233.2***	18.52***
R^2		0.2154	0.8042	0.7917	0.2154	0.8042	0.7917

***, ** and * indicated the coefficient is significantly different from zero at 1%, 5% and 10% level respectively. The estimated robust standard errors are in parentheses.
Time dummies used, but are not shown in the table above.

Table 7. Trade Credit Supply Cross-Country Analysis (continued)

This table reports the coefficients of the trade credit supply using the proxy accounts receivable by total assets ratio of each firm on the sample estimated using pooled OLS (with and without trade credit supply lagged as independent variable) and fixed effects data panel. The independent variables of the Equation 2 and 3 were described on the section 4.3. Group I has Brazil (dBR) as country reference and Group II has France, Germany and UK (dFGU) as country reference.

Variable		Group I			Group II		
		Pooled OLS		Fixed Effects	Pooled OLS		Fixed Effects
		I	II		I	II	
log(SIZE)*GFC	+	-0.0003	-0.0001	-0.0005	-0.0003	-0.0001	-0.0005
		(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
dBR*GFC	+/-				-0.0021	-0.0106*	-0.0011
					(0.011)	(0.006)	(0.006)
dIS*GFC	+/-	0.0039	0.0110	0.0040	0.0018	0.0004	0.0029
		(0.013)	(0.007)	(0.006)	(0.009)	(0.005)	(0.004)
dFGU*GFC	+/-	0.0021	0.0106	0.0011			
		(0.011)	(0.006)	(0.006)			
log(SIZE)*EUR	+	0.0004	0.0004	-0.0009	0.0004	0.0004	-0.0009
		(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
dBR*EUR	+/-				0.0059	-0.0155***	0.0071
					(0.012)	(0.006)	(0.006)
dIS*EUR	+/-	-0.0114	0.0086	-0.0195***	-0.0055	-0.0070*	-0.0123***
		(0.014)	(0.007)	(0.008)	(0.009)	(0.004)	(0.005)
dFGU*EUR	+/-	-0.0059	0.0155***	-0.0071			
		(0.012)	(0.006)	(0.006)			
Number of obs.		19,228	16,422	19,228	19,228	16,422	19,228
F-test		62.96***	1,233.2***	18.52***	62.96***	1,233.2***	18.52***
R^2		0.2154	0.8042	0.7917	0.2154	0.8042	0.7917

***, ** and * indicated the coefficient is significantly different from zero at 1%, 5% and 10% level respectively. The estimated robust standard errors are in parentheses.
Time dummies used, but are not shown in the table above.

In the first set of results (Equation 2) with Brazil (dBR) as country reference, can be observed that using pooled OLS without the lagged variable, European countries (dIS and dFGU) usually supply more trade credit than Brazil, although just in Italy and Spain (dIS) the coefficient is significant. However, this is the set of countries that interest here since it is visible using fixed effects that during the Euro crisis (2011) the trade credit supply – which is normally greater in dIS than dBR – contracts in Italy and Spain relatively to Brazil (i.e., the sign of dIS*EUR is negative and significant).

The inference that European companies decrease their trade credit supply during the Euro crisis, and more than those countries suffering more with credit shortage decreased more the

trade credit movement, goes against our hypothesis of the trade credit usage as substitute or complement during crisis periods. Nevertheless, it can be explained by the previous model (Equation 1), which enounced that during crisis periods fewer bank loans will cause a decrease of trade credit supply since the firms cannot access loans then the company liquidity is not enough to provide trade credit to their customers even if they demand more.

Furthermore, looking at pooled OLS with lagged TRADE_CREDIT outputs, the opposite result appears: Brazilian firms supply more trade credit than European firms, since there is evidence (coefficient negative and significant) that France, Germany and UK cluster supply less than Brazil, moreover during 2011 French, German and British (dFGU*EUR) firms increased their supply compared to Brazil, showing that the companies in dFGU could have used more trade credit because they needed a substitute and/or complement to bank loans.

Paralleling these findings to the robustness test (Equation 3) with France, Germany and UK (dFGU) as reference, the conclusion is qualitatively unchanged. Even comparatively to dFGU there is significant evidence that Italian and Spainish (dIS) firms supply more trade credit in normal times, but during the Euro crisis these firms reduce their trade credit supply – pooled OLS with lagged TRADE_CREDIT and fixed effects coefficients for dIS*EUR are significant and negative. The main differences of this estimation is that there is the confirmation that through crisis periods the trade credit supply shrinks since European crisis (EUR) is significant and negative using pooled OLS without lagged variable, and even though there is no evidence that during the global financial crisis (GFC) the trade credit supply retracted, the GFC coefficients were less negative than EUR, exposing the possibility that the European crisis hampered more the trade credit supply than the subprime crisis, despite of the later had a greater worldwide impact. This possibility could be true and aligned to Love, Preve and Sarria-Allende (2007) findings, since the firms can be suffering from a bigger credit shortage as most of the banks could not properly recover from the subprime crisis and are already facing a new financial crisis, thus if the corporations do not have access to bank loans than it is more difficult to them to supply trade credit as they need to maintain their own liquidity first.

Lastly, Group II lagged pooled OLS estimation revealed evidence of trade credit supply decreased in Brazil relatively to France, Germany and UK cluster during the European crisis (dBR*EUR), looking back the Equation 1 results, it is possible to assume that this trade credit

supply reduction happens because the financial crisis did not extend Brazil with the same intensity as in Europe (impact on economy growth, GDP, was not as aggressive as in Europe) or the motive is that the bank loans did not contract as in Europe (as analyzed on Table 2) and the Brazilian firms could get loans instead of trade credit.

So, all these results lead us to believe that our previous hypothesis that during financial crisis Brazilian firms would supply less trade credit than European firms because in Europe firms would use more trade credit as substitute and/or complement do not occur in all cases, since there is evidence that more affected countries supplied fewer trade credit.

However, some of the results were contradictory (using pooled OLS with lagged TRADE_CREDIT) showing evidence that this hypothesis is valid and that there is evidence that Brazilian firms supplied less trade credit in both financial crisis (Equation 3).

Regarding the transmission hypothesis, during the European crisis (log(SIZE)*EUR) the outcomes were negative but not significant and during the global financial crisis (log(SIZE)*GFC) the coefficients were undefined (positive using pooled OLS and negative using fixed effects) and not significant. Hence, there is no evidence that during financial crisis firms SIZE influences the trade credit supply movement nor possible applicable supply trend, so it is not feasible to arrive at a conclusion about the transmission hypothesis.

Finally, to test if the trade credit supply was motivated by a surplus in the demand on these countries during financial crisis, the countries' dummies, the temporal dummies and the interactions were tested against accounts payable (proxy for trade credit demand). The results using pooled OLS and fixed effects panel data are presented on Table 8.

Primary, the log of total assets (SIZE) coefficient is negative and significant for all the possibilities of estimation, which was already expected because large firms (many listed companies are multinationals or big national organizations) do not demand as much trade credit as small firms, since large organizations can easily contract bank loans or other cheaper credit forms as their creditworthiness is usually good.

Table 8. Trade Credit Demand Cross-Country Analysis

This table reports the coefficients of the trade credit demand using the proxy accounts payable by total assets ratio of each firm on the sample estimated using pooled OLS with trade credit supply lagged and not lagged and fixed effects with trade credit supply not lagged. The independent variables are: log of total assets (SIZE), country dummies (dBR, dIS and dFGU), temporal crisis dummies (GFC and EUR) and dummies interactions. Group I has Brazil (dBR) as country reference and Group II has France, Germany and UK (dFGU) as country reference.

Variable		Group I			Group II		
		Pooled OLS		Fixed Effects	Pooled OLS		Fixed Effects
		(t)	(t-1)		(t)	(t-1)	
Constant		0.1168***	0.1124***	0.2717***	0.1656***	0.1626***	0.2717***
		(0.005)	(0.005)	(0.027)	(0.004)	(0.004)	(0.027)
log (SIZE)	-	-0.0078***	-0.0071***	-0.0298***	-0.0078***	-0.0071***	-0.0298***
		(0.001)	(0.001)	(0.006)	(0.001)	(0.001)	(0.006)
dBR	-				-0.0489***	-0.0503***	
					(0.002)	(0.003)	
dIS	+	0.0954***	0.0977***		0.0465***	0.0475***	
		(0.004)	(0.004)		(0.003)	(0.003)	
dFGU	+	0.0489***	0.0503***				
		(0.002)	(0.003)				
GFC	+	0.0132	-0.0004	0.0245	0.0108	-0.0043	0.0224
		(0.021)	(0.012)	(0.018)	(0.021)	(0.010)	(0.018)
EUR	+	0.0263	0.0233*	0.0354**	0.0169	0.0112	0.0185
		(0.023)	(0.014)	(0.016)	(0.019)	(0.012)	(0.012)
log(SIZE)*GFC	-	-0.0017	0.0014	0.0000	-0.0017	0.0014	0.0000
		(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
dBR*GFC	+				0.0023	0.0039	0.0021
					(0.007)	(0.009)	(0.004)
dIS*GFC	+	0.0224**	0.0074	0.0187***	0.0247***	0.0112	0.0208***
		(0.011)	(0.012)	(0.005)	(0.009)	(0.009)	(0.004)
dFGU*GFC	+	-0.0023	-0.0039	-0.0021			
		(0.007)	(0.009)	(0.004)			
log(SIZE)*EUR	-	-0.0031	-0.0026	0.0002	-0.0031	-0.0026	0.0002
		(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
dBR*EUR	+				0.0094	0.0122*	0.0169**
					(0.010)	(0.008)	(0.008)
dIS*EUR	+	0.0040	-0.0074	-0.0098	0.0134	0.0047	0.0071
		(0.013)	(0.011)	(0.010)	(0.010)	(0.009)	(0.007)
dFGU*EUR	+	-0.0094	-0.0122*	-0.0169**			
		(0.010)	(0.008)	(0.008)			
Number of obs.		19,228	16,422	19,228	19,228	16,422	19,228
F-test		58.02***	57.30***	5.03***	58.02***	57.3***	5.03***
R^2		0.0419	0.0428	0.7562	0.0419	0.0428	0.7562

***, ** and * indicated the coefficient is significantly different from zero at 1%, 5% and 10% level respectively. The estimated robust standard errors are in parentheses.
Time dummies used, but are not shown in the table above.

Considering the results when Brazil is the reference (Group I), it is possible to observe that all the European groups (dIS and dFGU) demanded more trade credit than Brazil from 2001 to 2011, as the pooled OLS without lagged TRADE_CREDIT coefficients were significant and positive, following the Equation 2 scores that show that trade credit supply in Europe was also greater than in the emerging country. Besides, it is noticeable that Italian and Spanish firms have demanded more trade credit than in the other European countries, presenting the reason for the increased supply in these countries (dIS of Equation 2), although the demand increased more than the supply showing that there is still space for more trade credit.

This set of result also indicates using fixed effects that during the European crisis (EUR) more trade credit was demanded by the firms (coefficient positive and significant), revealing the possibility of trade credit usage as bank loan substitute or complementary tool to higher the company' creditworthiness. However, the firms from the dFGU cluster during this recent crisis (dFGU*EUR) demanded less trade credit than in Brazil, as the result is negative and significant for fixed effects, raising the possibility that these companies decided to do not leverage themselves during the European crisis, as it is the second financial crisis in four years, preferring to cut some projects and investments instead of getting more credit, following the path that Ivashina and Scharfstein (2010) discovered analyzing firms during the subprime crisis.

The opposite movement happened during the global financial crisis of 2008 in Italy and Spain (dIS*GFC), these countries firms demanded more trade credit relatively to Brazil (dBR) and France, Germany and UK cluster (dFGU) since the result is positive and significant using all methods of estimation on Groups I and II, exposing the possibility that trade credit has being used as substitute or complement to bank loans in Italian and Spanish firms during the subprime crisis.

The Group II, where France, Germany and UK (dFGU) are the reference, shows once again that Italy and Spain increased the trade credit demand compared to the other European countries (dIS positive and significant using pooled OLS), but Brazil decrease the demand relatively to France, Germany and UK (dBR negative and significant using pooled OLS), probably because the Brazilian bank loans increased more during this periods as analyzed on section 4, so Brazilian firms did not need trade credit to be substitute or complement. Even though, there is evidence using fixed effects that during the European crisis Brazilian firms

(dBR*EUR) demanded more trade credit than dFGU, showing that these firms used trade credit as substitute and complement to bank loans to finance their projects during crisis periods. This movement can also be the reflex of trade credit refusal that French, Germany and British companies seem to adhere during crisis evidenced by Group I results.

6. CONCLUSION

The main objective of this study was to analyze the trade credit supply behavior during financial crisis periods in different country sets. The sample had annual figures of 2,462 firms from six countries – Brazil, France, Germany, Italy, Spain and United Kingdom – that fit in six non-financial ICB industries. The firms' data comes from Bloomberg (2012) and represents the period of 2000 to 2011, considering 2008 the year of 'global financial crisis' and 2011 the year of 'European crisis'. It was also used IMF (2012) country economic statistics as outstanding commercial bank loans and GDP from 2004 to 2011. With this database, we created models to estimate the trade credit supply using pooled OLS and fixed effects panel data.

The results of trade credit determinants met the findings of previous Brazilian studies of Schiozer and Brando (2011) and Saito and Bandeira (2010). Also the outcomes attested some trade credit theories created, for example that profitable companies supply more trade credit as Petersen and Rajan (1997) previously found, and that firms inserted in competitive markets and good debt capacity continue to supply trade credit as a form of boosting sales, consistent with Burkart and Ellingsen (2004). Based on these results we found that during long regular periods trade credit is used as substitute and also as complement, like Gama, Mateus and Teixeira (2008) findings for Spanish and Portuguese small and medium firms.

Though, the first main result is that through normal periods the decrease of bank loans in fact increases the trade credit supplied, just like Alphonse, Ducret and Séverin (2006) found, which supports the idea that trade credit is used as a substitute to bank loans. However, when the same loan movement is observed during economic contraction, we discovered an opposite outcome, as the bank loans increase the trade credit supply follows the same trend, presenting evidence that trade credit is used as complement of bank loans during crisis periods, corroborating Love, Preve and Sarria-Allende's (2007) study which concluded that firms during post peak-crisis do not supply trade credit because they lack funding themselves.

Subsequently, we used a cross-country model to find out if there are differences on trade credit supply between countries clusters during regular times and financial crisis periods, in order to discover if our multi-country trade credit hypothesis were valid. The clusters studied were: (i) the emerging market: Brazil, (ii) the European countries that still suffer from credit

shortage: Italy and Spain, (iii) the European countries that are recovering well from the crisis: France, Germany and United Kingdom. We first estimate the trade credit supply with determinants variables plus time-based and geographical controls, after we roughly estimated trade credit demand using just the dummies and interactions.

This approach leads us to similar conclusions from Love, Preve and Sarria-Allende (2007) article, as the significant figures come from the European countries during the recent Euro crisis. The European firms diminish the trade credit supply during 2011, moreover the group comprising Italian and Spanish organizations decreased more the supply than companies from the other European nations. These results together with the credit analysis by country done with the economic statistics, lead us to believe that happened a meaningful credit contraction in Europe after the subprime crisis and European firms are facing difficulties to access bank loans, as these companies do not have liquidity in excess, through debt nor cash, they do not supply more trade credit to their buyers. We can compare these results during the European crisis to the emerging countries firms on Love, Preve and Sarria-Allende (2007) study after the peak of their financial crisis, as the companies did not have enough loans to guarantee that they would pass capital along to their customers.

During the trade credit demand estimation, we found that this case during the European crisis can also be related to liquidity management, since there is evidence that it is not just a supply problem. We observed that French, Germany and British firms decreased the demand for trade credit during 2011 crisis, contradicting with our expectations and making us believe that this result occurs because the companies have to choose or to increase their debt level or to decrease their investments. On this tradeoff, during financial crisis, these firms prefer to cut their investments and projects reflecting the actions took by American firms analyzed by Ivashina and Scharfstein (2010) during the subprime crisis.

Furthermore, we could verify that there is evidence that our hypotheses – during financial crisis trade credit substitution and complement usage are more apparent in more affected countries since there is more demand for alternative credit source – are just true when we compare the trade credit supply in Brazil with France, Germany and UK. In this case, the coefficients shows that European firms supplier more trade credit, indicating that buyers could use more trade credit to finance their projects (substituting the bank loans) and/or could use trade credit to get access to bank loans (complementing the bank loans).

However, we discovered evidence that the substitution and complementary hypotheses in a European cross-country analysis do not apply, as lesser is the country impacted by a financial crisis, the greater seem to be the trade credit supply from its firms. This result can be interpreted as a liquidity management problem, because during financial crisis the firms suffer with credit shortages which can affect the company liquidity, and there is the possibility that these issues are more problematic in more impacted countries.

On the other hand, we could not find any evidence to conclude if the transmission hypothesis – during financial crisis large firms transmit the capital to their supply chain through trade credit supply as they can access to bank loans – is applicable.

These results regarding the hypotheses show that the present study is totally aligned with Santos, Sheng and Bortoluzzo (2011) paper, especially if we consider the results relative to Brazilian firms as the country was present in both researches. As the authors also found that the substitution hypothesis occurred during the global financial crisis in most of the cases and that the size of the firms has the opposite effect on the trade credit supply since huge organizations do not depend on trade credit to pass through crisis periods.

Therefore, this research paper can be the start to some further analysis, considering our results and as suggestion for future studies, an analysis to understand the behavior of trade credit demand in a multi-country setting could be done; also it would be interesting to verify if the liquidity management theories apply to European firms during the financial crisis.

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