

SHORT-TERM DEBT, ASSET TANGIBILITY AND THE REAL EFFECTS OF FINANCIAL
CONSTRAINTS IN THE SPANISH CRISIS

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SHORT-TERM DEBT, ASSET TANGIBILITY AND THE REAL EFFECTS OF FINANCIAL CONSTRAINTS IN THE SPANISH CRISIS

This paper uses Spanish non financial firms' data from 1991 to 2011 to analyze the differential contractionary effect of financial constraints at the onset of the crisis on investment and employment growth. Specially, I test whether the contraction in these variables is stronger among firms whose financing relied more heavily on short-term debt or that have a larger proportion of tangible assets among their total assets. Hence, I use a difference-in-differences approach to document the real effects of the financial constraints supposedly suffered by Spanish firms during the crisis. I find a positive and statistically significant differential effect of Asset Tangibility and a negative and statistically significant differential effect of Refinancing Needs on Investment at the outset of the crisis. However, neither Asset Tangibility nor Refinancing Needs explain a differential behavior of Employment Growth at the arrival of the crisis.

1 Introduction

The global financial crisis initiated in August 2007 and intensified in September 2008 after the bankruptcy of Lehman Brothers has immersed many of the economies around the world into recession. According to many recent studies [see, for example Ivashina and Scharfstein (2010)], the origins of the crisis were in the credit boom, followed by the meltdown of the sub-prime mortgages and securitized products. The immediate implications of this situation were, above all, a loss of solvency of the financial sector, a dramatic fall of prices across most asset classes and commodities and a substantial increase of the cost of corporate and bank borrowing.

Similar developments occurred in Spain. The real GDP growth started to decline in 2007 and reached a negative rate of -3.6% in 2009. The international economic problems, together with some special features of Spanish economy (credit boom and fast expansion of housing prices, among others) caused heavy losses to the financial sector. One consequence was the liquidity and capital shortage of many Spanish financial institutions followed by a credit contraction. According to the *Annual Report* of the Banco de España in 2009, the rates of growth of credit offered by banks to the private sector started to decrease from levels of around 11% at the beginning of 2008, reaching negative values of -0.3% and -0.1% in 2009.

The significant magnitude of the current financial crisis emphasizes the importance to understand the real effects of the shocks to the supply of bank credit. The main motivation of this article is to investigate the role of financial constraints in the contraction of investment and employment growth at the outset of the current crisis in Spain. Following identification strategies recently used in the corporate finance literature, the plan is to examine the differential contractionary impact of the crisis on firms which financing relied more heavily on short-term funding and on the presence of tangible assets among their total assets. I treat the arrival of the crisis in 2009 as a sort of "natural experiment" and study the influence of short-term debt and asset tangibility in shaping the differential response in investment and employment growth among Spanish non financial companies.

This paper is inspired by the work of Almeida *et al.* (2011) on US firms. They find that firms with a large fraction of their long-term debt scheduled to mature after the 3rd quarter of 2007 cut their investment to capital ratio during the first three quarters of 2008 by 2.5% more (relative to the pre crisis level) than the rest of the firms. Moreover, they find

that the maturity of long-term debt had no impact on the evolution of investment prior to the crisis, as well as after the start of the crisis for any firm for which long-term debt was not a major source of funding.

Following this idea, I center my attention to the weight of short-term debt on the total of assets in Spanish firms. According to theory, in the frictionless world of Modigliani and Miller Theorem, the maturity of corporate debt (as well as the overall amount of debt) is irrelevant.

Real corporate decisions are made with the objective of maximizing the value of the firm and such maximization is not affected by financing decisions at all. However, in a market with frictions, firms may be financially constrained and the maturity of the debt may condition the real decisions, especially when experiencing an unexpected shock to the availability of credit.

In the environment with a credit supply shock, those firms that have urgent financial needs due to the maturity of a large fraction of their pre-existing debt may find it more difficult to stick to the investment and production plans that would be optimal in the absence of the financial difficulties. The need to repay their short-term debt so as to avoid default, and the harder refinancing conditions may force the firms into larger contractions of investment or employment than those experienced by “less constrained” firms.

The importance of asset tangibility for the real decisions of financially constrained firms has been shown by Almeida and Campello (2007) using Compustat data. According to these authors, tangible assets support firms’ borrowing, which allows for further investment. The investigation of the impact of financial constraints on corporate investment explores the idea that variables that increase firms’ ability to obtain external funding may also increase investment when the access to credit is imperfect. Tangible assets fulfill these characteristics. They act as collaterals mitigating contractibility problems. Among other things, tangibility increases the value that can be captured by creditors in default states, reduces firms’ incentives to default strategically, can be used as a screening device in environments with asymmetric information, etc. Since tangible assets serve as a support for financially constrained firms, their differential effect on investment at the onset of the crisis might be appreciable. Firms with larger fraction of tangible assets among their total assets are expected to have higher capacity to invest or keep employment.

I use yearly data from the balance sheets and income statements of 24,202 Spanish non financial firms belonging to the sectors of Manufacturing Industries, Wholesale Suppliers and Retailers, and Other Services during the period 1991-2011. The data come from the Central de Balances of the Banco de España.

The empirical strategy is designed to explore the effects of financial constraints on real corporate decisions. The variable Refinancing Needs is defined as the ratio of firms’ short-term debt over total assets and measures firms’ repayment obligations. The variable Asset Tangibility is computed as the ratio of firms’ fixed assets over total assets. I specify two baseline regression equations where Investment and Employment Growth are explained as a function of Asset Tangibility, Refinancing Needs, Temporary Employment (in the Employment Growth equation), a set of other control variables and the interaction terms of Refinancing Needs, Asset Tangibility and Temporary Employment with the dummy variable called Crisis (which in the baseline specification is equal to one in 2009 and zero otherwise). Using these interaction terms, I try to capture the impact of the Asset Tangibility, Refinancing Needs and Temporary Employment (in the Employment Growth equation) on decisions on investment and employment at the onset

of the current financial crisis. I employ the difference-in-differences approach to see the differential effect of financial constraints on investment and employment decisions of firms with larger fraction of tangible assets among their total assets, firms that rely more on short-term funding or that have a large fraction of temporary workers when the crisis begins. To verify the results, I estimate a wide range of variations of the baseline regressions.

I find that Refinancing Needs has a negative and statistically significant effect on Investment. Before the crisis, a 1% increase of Refinancing Needs decreases corporate Investment by 0.04%. With the arrival of the crisis, firms with an extra 1% of Refinancing Needs reduce their Investment in an extra 0.07%. Furthermore, the differential effect of Refinancing Needs on Investment between firms located at the 90% and the 10% level of the percentile distribution of Refinancing Needs is -4.31%.

Asset Tangibility has a positive and statistically significant effect on Investment, such that a 1% increase of Asset Tangibility rises Investment by 0.11%. At the arrival of the crisis, a 1% of Asset Tangibility foments corporate Investment by an additional 0.03%. The differential effect of Asset Tangibility on Investment between firms in the 90th and the 10th percentile level of Asset Tangibility is 1.78%.

The results are different in the Employment Growth equation. In normal circumstances, both Refinancing Needs and Asset Tangibility are positively correlated with Employment Growth. However, there is no clear effect associated with these variables when the crisis arrives. Instead, Temporary Employment emerges as a key explanatory factor for the different speeds of job destruction among Spanish firms.

The remainder of this article is organized as follows: In Section 2, I review the literature that pays attention to the effects of financial constraints of the current financial crisis. Section 3 describes the data and the sample used in my study. In Section 4, I provide a description of the empirical analyses. Section 5 contains the main results for the Investment equation. Section 6 describes the main results for the Employment Growth equation. Section 7 offers the main conclusions of my analyses.

2 Literature

Many economists address their investigation to the problems of financial market disruptions and their impact on real firms' decisions. Ivashina and Scharfstein (2010) study the characteristics of the bank lending at the beginning of the financial crisis in the US and document the existence of a supply shock in the US credit market. They state that new lending in 2008 was significantly below new lending in 2007. The new loans to large borrowers fell in the fourth quarter of 2008 by 47% relative to the prior quarter and by 79% with respect to the peak of the credit boom in the second quarter of 2007. This decline accelerated during the financial crisis.

There are two papers that serve as the main references literature for my study. In the first one, Almeida *et al.* (2011) study the causal effect of financial contracting characteristics of US corporations on their real decisions. They identify August 2007 as the onset of a crisis that caused a supply shock in the credit market. Using Compustat data and a difference-in-differences matching estimator they verify the effect of the debt maturity structure on investment. They find that firms whose long-term debt was maturing right after the third quarter of 2007 cut their investment to capital ratio by 2.5 % more than otherwise similar firms with debt scheduled to mature after 2008. Moreover, they discover that long-term debt maturity composition did not affect the investment of those firms for which long-term debt was not the major source of funding.

The second reference paper, written by Almeida and Campello (2007), demonstrates the relevance of the asset tangibility for corporate investment. Starting from the premise that tangible assets support more borrowing, which in turn allows for further investment, they exhibit a non-monotonic effect of tangibility on the cash flow sensitivities. The main tools in their analyses are Kiyotaki and Moore's (1997) credit multiplier, difference-in-differences approach, and the switching regression framework where the probability that the firm is financially constrained is jointly estimated with the investment equation.

Duchin, Ozbas and Sensoy (2010) explore how financial constraints affect corporate investment through the internal financial resources (cash reserves) and the external financing channel, specifically short-term debt. They regress firm-level quarterly investment over July 1, 2006-June 30, 2008 on an indicator variable that identifies the onset of the crisis, the interaction of this indicator variable with the firm's cash reserves measured one year prior to the start of the crisis, Tobin's Q and cash flow. They find that the corporate investment declines by 6.4% of its unconditional mean following the onset of the crisis. They show a positive and significant relationship between investment and cash reserves. They highlight that the decline in investment is greater for financially constrained firms and industries dependent on external finance. They demonstrate the importance of short-term debt and the irrelevance of long-term debt on investment.

Bentolilla *et al.* (2013) study the effects of the credit supply shock on job losses in Spain. Using a database that combines firm and bank data, they pay a special attention to the differences in bank's health at the onset of the crisis. They show that the banks that were intervened by the supervisor reduced the credit supply more than other banks. They compare employment changes from 2006 to 2010 in firms that obtained a significant share of funding from intervened banks and firms financed with credit from healthy banks.

Garicano and Steinwender (2013) compare Spanish manufacturing firms that are foreign owned to those that are Spanish owned. The conjecture is that foreign owned firms have possible alternative financing channels, meanwhile the Spanish owned firms are financially constrained at the onset of the crisis. Using data from Encuesta sobre Estrategias Empresariales (ESEE, Survey of Business Strategies), they apply difference-in-differences approach allowing for firms fixed effects and for industry specific time effects. They show that capital constrained firms (Spanish owned firms) reduce employment by 6% and investment by 19% more than unconstrained firms. The lack of access to funding forces Spanish owned firms to cut their investment, further.

In an article relevant to understand the role of fixed-term contracts in explaining job destruction during the crisis, Caggese and Cuñat (2008) develop a model where they study the interactions between financing constraints and the employment decisions of firms when both fixed-term and permanent employment contracts are available. The model predicts that financially constrained firms use fixed-term workers more intensely and make them absorb a larger fraction of total employment volatility than financially unconstrained firms do. They test the predictions of the model with a panel data of Italian manufacturing firms.

There is a large literature that studies other aspects of the financial crisis. Tong and Wei (2008) explain stock price changes following the crisis and find that stock price declines were more severe for more financially constrained firms. Campello, Graham and Harvey (2010) find evidence that firms forego profitable investment opportunities during the crisis due to the binding external financing constraints. García-Appendini and Montoriol-Garriga (2013) study

the effect of the 2007-2008 financial crisis on between-firm liquidity provision. Carbó Valverde *et al.* (2008) show that bank loans predict investment for unconstrained firms, but not for constrained firms, and trade credit predicts investment, but only for constrained firms. Molina (2012) analyses the patterns and determinants of the trade credit received and given by Spanish firms (as a close substitute of the bank credit) before and during the crisis.

The evidence found in all those papers points to a significant tightening of financial constraints during the crisis, both in the US and in Spain.

3 Data

I am using yearly panel data from balance sheets and income statements of Spanish non-financial firms during the period 1991-2011. The source of my data is the Central de Balances of the Banco de España. It is a database that gathers economic and financial information provided voluntarily by Spanish non-financial companies. The original sample contains 177,743 observations of 34,929 different firms during the period from 1991 to 2011. These companies belong to 18 sectors defined according to the National Classification of Economic Activities 2009 (CNAE 2009).

In order to perform my analysis, I disregard corporations that belong to the sectors Agriculture, Ranching, Fishing, Extraction Industries, Supply of Energy, Gas, and Steam and Supply of Water. The reason is that these kinds of industries are usually heavily regulated or subsidized. I also dismiss companies from the sectors Construction and Real Estate Activities given their role in engendering and triggering the financial crisis. Following Almeida *et al.* (2011), I eliminate observations with negative values of fixed assets, intangible assets, current liabilities, non current liabilities, short-term and long-term debt with credit institutions, average permanent employment and own funds. I also eliminate observations with zero values of average total employment, sales and total assets. The aim of this filter is to ignore companies that are inactive or that present errors in the questionnaires provided to the Banco de España. In order to avoid large breaks or jumps in the time series dimension, I omit companies experienced mergers and spin-offs.

According to Almeida and Campello (2007), there are studies in the literature that use relatively short data panels and that require firms to provide observations during the entire period of investigation [e.g., Whited (1992), Himmelberg and Petersen (1994), and Gilchrist and Himmelberg (1995)]. As Almeida and Campello (2007) mention, there are advantages of this attrition rule in terms of series consistency and stability of the data process. However, my panel is long and, on the other hand, quite unbalanced, so forcing the individual data to be available for the whole period is not as needed and would mean a loss of observations. Therefore, I do not apply this selection.

Finally, to deal with outliers, I follow Duchin, Ozbas and Sensoy (2010) and Almeida *et al.* (2011), among many others, and I winsorize all the variables at the 1st and 99th percentiles.

After implementing all the filters, my final sample contains 127,022 observations of 24,202 different firms during the period from 1991 to 2011. The firms belong to the sectors Manufacturing Industries, Wholesale Suppliers and Retailers, and Other Services.

4 Empirical Analysis

My research exploits the “natural experiment” part of the crisis. If financial constraints matter and if they are more pressing for firms with lots of maturing debt at the time access to finance becomes hit by the crisis then, I would expect a sharp effect of the crisis on real variables among firms with lots of maturing debt during the crisis period.

If tangible assets are able to provide collaterals to firms and hence, increase their capacity to obtain funding during crises, I should see a reinforcement of the typically positive effect of tangible assets on investment and employment at the onset of the crisis.

The baseline regression equation for Investment is intended to capture these issues:

$$I_{it} = \alpha_1 X_{it-1} + \alpha_2 AT_{it-1} + \alpha_3 RN_{it-1} + \beta_1 AT_{it-1} * Crisis + \beta_2 RN_{it-1} * Crisis + \sum_{i=1}^N Firm_i + \sum_{t=1993}^{2011} Year_t + \varepsilon_{it}, \quad [1]$$

where I_{it} represents the dependent variable Investment of firm i in year t . Investment is defined as the log of the ratio of Total Assets measured in period t over Total Assets measured in period $t-1$. The definition used expresses the rate of growth of Total Assets interpreted as a proxy of firms' investment.¹

The inclusion of the set of control variables has the aim of minimizing the endogeneity problem. In order to deal with the multicollineality, endogeneity and reverse causality problems and to minimize them, all the independent variables are lagged one period.

α_1 is the vector coefficient of the vector X_{it-1} that contains the following control variables: Growth of Sales defined as the log of the ratio of Sales in period t over Sales in period $t-1$; the dummy variable Paying Dividends that takes value 1 if the company pays dividends to their shareholders in that year and value 0 otherwise; Return on Assets computed by the Bank of Spain as the ratio of Ordinary Net Profit plus Financial Expenditures over Assets Net of Costless Borrowings plus Price Adjustments; Cash Holdings calculated as Cash over Total Assets; Own Funds to Total Assets and, lastly, the Long-Term Debt ratio computed as Non Current Liabilities to Total Liabilities.

The variable AT_{it-1} represents Asset Tangibility and is defined as the ratio of Fixed Assets to Total Assets. The coefficient of AT_{it-1} is α_2 . RN_{it-1} measures the Refinancing Needs of the companies and it is defined as the ratio of Current Liabilities over Total Assets. Its coefficient is α_3 . Both of these variables are interacted with the dummy variable Crisis that (in the baseline specification) takes value 1 if the year is 2009 and value 0 otherwise. The coefficients of the interacted terms β_1 and β_2 , respectively, are the key coefficients of interest in the estimations, since they show the differential impact of Asset Tangibility and Refinancing Needs on the investment and employment decisions of firms at the arrival of the crisis.

The last term of the equation [1] makes it explicit the inclusion of firm fixed effects and year dummies. ε_{it} is the error term.

The baseline regression equation for Employment Growth is the following one:

$$\Delta \log L_{it} = \alpha_1 X_{it-1} + \alpha_2 AT_{it-1} + \alpha_3 RN_{it-1} + \alpha_4 TE_{it-1} + \beta_1 AT_{it-1} * Crisis + \beta_2 RN_{it-1} * Crisis + \beta_3 TE_{it-1} * Crisis + \sum_{i=1}^N Firm_i + \sum_{t=1993}^{2011} Year_t + \varepsilon_{it}, \quad [2]$$

¹ Many other studies rely on "capital expenses" or "working capital expenses" to define the Investment. Due to the limitations of my data, I could not use these variables.

where $\Delta \log L_{it}$ is the dependent variable Employment Growth of firm i in year t . Employment Growth is defined as the log of the ratio of Average Total Employment in t over Average Total Employment in $t-1$. The definition used expresses the rate of growth of Average Employment interpreted as a proxy of firms' investment in human resources.

TE_{it-1} is Temporary Employment, which is the ratio of Average Temporary Employment over Average Total Employment. Its coefficient is α_4 . Temporary Employment is also interacted with the dummy variable Crisis. The coefficient of the interaction term is β_3 . The rest of the variables is the same as in the baseline equation [1] defined above. The main goal of the baseline specification [2] defined for the dependent variable Employment Growth is to see the differential effect of Refinancing Needs, Asset Tangibility and Temporary Employment on Employment Growth at the beginning of the crisis.

Using the empirical design of Duchin, Ozbas and Sensoy (2010), among others, the main tool in my empirical analysis is then a linear regression in which I control for fixed effects at the individual level of each firm (intended to capture unobserved heterogeneity among firms), and year dummies (to capture possible effects of macroeconomic variables and common trends).

To analyze the impact of financial constraints on the real corporate decisions on investment and employment, I adopt a difference-in-differences approach. I will compare Investment and Employment Growth of firms with different levels of Refinancing Needs, Asset Tangibility and Temporary Employment (for Employment Growth) before and after the onset of the crisis. Specifically, to summarize the quantitative implications of the results and illustrate the economic importance of the effects associated with parameters β_1 , β_2 and β_3 (in the baseline equation [2]), I will compare the change in Investment and Employment Growth experienced by firms located at the 90th and the 10th percentile level of the distribution of the variables Refinancing Needs, Asset Tangibility and Temporary Employment.

I will also estimate four augmented versions of the baseline regression equations [1] and [2]. In the first one, I extend the interacted terms of Refinancing Needs, Asset Tangibility and Temporary Employment (in the baseline regression equation [2]) by their interactions with the dummy variables Crisis 2010 and Crisis 2011 that take value 1 if the year is 2010 and 2011, respectively, and value 0 otherwise. The main aim is to see if financial constraints have effects on Investment and Employment Growth beyond the arrival of the crisis in 2009. The second additional version includes the variables Refinancing Needs, Asset Tangibility and Temporary Employment interacted with all the year dummies during the period 1991-2011. The goal is, again, to see if the results of the basic equations [1] and [2] hold even when I allow for general trends in the effects of AT and RN on the dependent variables.

The third and fourth variations have the function of studying a causal effect of financial constraints on Investment and Employment Growth or, in the other case, the presence of possible endogenous behavior. I want to verify, if the differential effects on Investment and Employment Growth are due to the arrival of the crisis or, on the contrary, the impact is due to the changes in Refinancing Needs, Asset Tangibility and Temporary Employment adopted by firms in response to the crisis. Therefore, I fix the level of Refinancing Needs, Asset Tangibility and Temporary Employment at their values measured in 2006 and I interact these fixed values with the year dummies. The objective of all of these extended versions of the basic regression equations [1] and [2] is to see the consistency of the results.

To conclude this section, I provide the summary statistics of the main dependent and independent variables. Table 1 contains the descriptive statistics mean, standard deviation,

	Percentiles							Obs.
	Mean	Std. Dev.	10%	25%	50%	75%	90%	
Investment	0.052	0.197	-0.154	-0.049	0.039	0.143	0.275	96.641
Employment Growth	0.006	0.171	-0.154	-0.049	0.000	0.067	0.167	96.641
Asset Tangibility	0.267	0.226	0.027	0.085	0.209	0.392	0.602	127.022
Refinancing Needs	0.451	0.229	0.145	0.271	0.445	0.624	0.767	127.022
Temporary Employment	0.209	0.243	0.000	0.000	0.125	0.316	0.586	127.022

SOURCE: Author's elaboration.

percentile distribution and the number of observations of the variables Investment, Employment Growth, Asset Tangibility, Refinancing Needs and Temporary Employment observed during the whole period 1991-2011. It is worth highlighting the large cross sectional dispersion that is observed in all the variables presented in Table 1.

To see the time series variation of the variables, Table A1 in the Appendix contains the descriptive statistics of Investment, Employment Growth, Refinancing Needs, Asset Tangibility and Temporary Employment for each of the years in the period 2006-2011. It can be seen that the cross sectional dispersion is maintained large for all the variables during the whole period. Furthermore, we can observe that the values of Investment, Employment Growth and Refinancing Needs started to decline in 2007 and suffered the deepest reduction in 2009. This pattern is noticed in all the percentage levels of these variables. The percentage distribution also shows that 25% of firms had negative values of Investment and Employment Growth during the whole period. Asset Tangibility experienced an increase during the years 2008 and 2009 in all except the 10th percentage level where the values decreased during these years. Temporary Employment was declining progressively during the period 2007-2011 in all levels of the percentage distribution.

5 Results for the Investment Equation

In this section I describe the results obtained in the Investment equation. Table 2.A contains the results obtained in the baseline specification [1] of the Investment equation and its variations. Table 2.B presents the coefficients of the interaction terms of Asset Tangibility and Refinancing Needs with the year dummy variables in all of the variations of the Investment equation.

The column Baseline Specification of Table 2.A contains the results obtained in the baseline specification of the Investment equation [1]. The following columns show the results of the variations of the baseline specifications of the Investment Equation. Column (1) includes the interacted terms of Asset Tangibility and Refinancing Needs with the dummy variables Crisis 2009, Crisis 2010 and Crisis 2011. Column (2) presents the results of the regression where Asset Tangibility and Refinancing Needs are interacted with all the year dummy variables from the whole period 1991-2011. Column (3) displays the results of the regression where “the fixed values of Assets Tangibility and Refinancing Needs” measured in 2006, AT_{i2006} and RN_{i2006} , are interacted with the year dummies from the period 2006-2011. Finally, column (4) shows the results of the regression where AT_{i2006} and RN_{i2006} are interacted with all the year dummies from 1991 to 2011.

Table 2.B presents the coefficients of the interaction terms of the independent variables AT, RN, AT_{i2006} and RN_{i2006} with the year dummies obtained in the variations of the Investment equation. Column (2) presents the results obtained in the regression where AT and RN are

	Baseline Specification	(1)	(2)	(3)	(4)
Asset Tangibility	0.1060*** (0.0111)	0.0986*** (0.0114)	0.0493** (0.0202)	0.0879*** (0.0117)	0.0848*** (0.0119)
Crisis 2009*AT	0.0273** (0.0134)	0.0399*** (0.0140)			
Crisis 2010*AT		0.0329** (0.0141)			
Crisis 2011*AT		0.0551*** (0.0144)			
Refinancing Needs	-0.0416* (0.0221)	-0.0454** (0.0221)	-0.0163 (0.0274)	-0.0243 (0.0240)	-0.0300 (0.0241)
Crisis 2009*RN	-0.0695*** (0.0170)	-0.0652*** (0.0176)			
Crisis 2010*RN		0.0069 (0.0185)			
Crisis 2011*RN		0.0240 (0.0186)			
Growth of Sales (1st lag)	0.0018 (0.0049)	0.0018 (0.0049)	0.0024 (0.0049)	0.0065 (0.0055)	0.0073 (0.0055)
Growth of Sales (2nd lag)	0.0129*** (0.0047)	0.0129*** (0.0047)	0.0130*** (0.0047)	0.0152*** (0.0052)	0.0154*** (0.0052)
Paying Dividends	0.0107* (0.0059)	0.0108* (0.0059)	0.0107* (0.0059)	0.0123** (0.0062)	0.0119* (0.0062)
Return on Assets	-0.0034 (0.0032)	-0.0035 (0.0032)	-0.0038 (0.0032)	0.0003 (0.0035)	0.0003 (0.0035)
Cash Holdings	-0.0148 (0.0145)	-0.0152 (0.0145)	-0.0158 (0.0145)	0.0102 (0.0158)	0.0102 (0.0158)
Own Funds	0.2760*** (0.0200)	0.2760*** (0.0201)	0.2760*** (0.0201)	0.2520*** (0.0214)	0.2550*** (0.0214)
Long-Term Debt	-0.05380*** (0.0122)	-0.0551*** (0.0123)	-0.0550*** (0.0123)	-0.04120*** (0.0131)	-0.0397*** (0.0131)
Constant	-0.1600*** (0.0204)	-0.1810*** (0.0219)	-0.1800*** (0.0220)	-0.1550*** (0.0242)	-0.2060*** (0.0270)
Observations	65.146	65.146	65.146	48.306	48.306
R-squared	0.249	0.250	0.252	0.213	0.214

SOURCE: Author's elaboration.

interacted with all the year dummies from the period 1991-2011². The following columns contain coefficients of AT_{i2006} and RN_{i2006} interacted with the year dummies from the period 2006-2011 [column (3)] and 1991-2011 [column (4)]. I control for fixed effects at the firm level and I include the year dummies in all of the regressions. The robust standard errors are provided in parenthesis. The significance of the coefficients is: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

2 I provide the results for the period 1995-2011. The results for the period 1991-1993 do not appear because the variable Growth of Sales involves 2 lags. 1994 is the reference year and its year dummy is omitted due to the inclusion of a constant in the regression.

	(2)		(3)		(4)	
	AT_t	RN_t	AT_{t2006}	RN_{t2006}	AT_{t2006}	RN_{t2006}
1995	0.0846*** (0.0231)	-0.00187 (0.0230)			0.0921*** (0.0329)	0.0587* (0.0320)
1996	0.127*** (0.0240)	-0.0549** (0.0235)			0.0941*** (0.0318)	-0.0174 (0.0324)
1997	0.00535 (0.0227)	-0.00571 (0.0234)			0.0197 (0.0316)	0.0583* (0.0315)
1998	0.0318 (0.0234)	-0.0145 (0.0237)			0.0304 (0.0303)	0.0911*** (0.0313)
1999	0.0202 (0.0237)	-0.0195 (0.0241)			0.0718** (0.0309)	0.0918*** (0.0313)
2000	0.0108 (0.0232)	-0.00709 (0.0243)			0.0217 (0.0300)	0.0649** (0.0302)
2001	0.0670*** (0.0239)	-0.0806*** (0.0243)			0.0857*** (0.0300)	0.0772** (0.0302)
2002	0.0544** (0.0237)	-0.0416* (0.0249)			0.0713** (0.0290)	0.0893*** (0.0304)
2003	0.0520** (0.0227)	-0.0472* (0.0245)			0.0817*** (0.0281)	0.0819*** (0.0290)
2004	0.0669*** (0.0233)	-0.00730 (0.0243)			0.0838*** (0.0279)	0.131*** (0.0293)
2005	0.0601*** (0.0231)	-0.0156 (0.0242)			0.0621** (0.0278)	0.138*** (0.0284)
2006	0.0210 (0.0231)	-0.0253 (0.0243)	-0.0437*** (0.0148)	0.0747*** (0.0168)	0.0213 (0.0276)	0.167*** (0.0291)
2007	0.0505** (0.0231)	-0.0304 (0.0243)	-0.00147 (0.0144)	0.000547 (0.0162)	0.0637** (0.0273)	0.0923*** (0.0286)
2008	0.0881*** (0.0237)	-0.0857*** (0.0254)	0.0246 (0.0156)	-0.0399** (0.0183)	0.0891*** (0.0280)	0.0499* (0.0299)
2009	0.0938*** (0.0229)	-0.101*** (0.0252)	0.0515*** (0.0155)	-0.0509*** (0.0185)	0.116*** (0.0278)	0.0380 (0.0299)
2010	0.0866*** (0.0228)	-0.0282 (0.0259)	0.0352** (0.0160)	-0.00566 (0.0190)	0.0993*** (0.0281)	0.0827*** (0.0300)
2011	0.109*** (0.0230)	-0.0107 (0.0258)	0.0533*** (0.0162)	-0.0223 (0.0193)	0.117*** (0.0282)	0.0657** (0.0303)

SOURCE: Author's elaboration.

I will center my attention on the coefficients of the main independent variables Asset Tangibility and Refinancing Needs and their interactions with the dummy variable Crisis 2009.

The coefficient of the variable Asset Tangibility is positive and statistically significant. If Asset Tangibility increases in 1%, the Investment of firms increases by 0.11%. The coefficient of the interaction term is also positive and statistically significant. Other things equal, when the variable Asset Tangibility increases 1% at the arrival of the crisis in 2009, Investment can be increased by 0.03% more than before the crisis. The quantitative effect of the differential

impact of Asset Tangibility on Investment at the onset of the crisis in 2009 among firms located at the 90th and the 10th percentile of Asset Tangibility's distribution in 2008 (i.e. Asset Tangibility = 0.6722 and Asset Tangibility = 0.0196, respectively), maintaining other things equal, is 1.78%.

These results confirm the initial hypothesis. Tangible assets are a relevant part of total firms' assets, since they increase firms' ability to obtain external financing and to invest. Asset Tangibility reduces the effects of the crisis on Investment and supports corporate Investment both in normal and crisis times.

The second variable of interest is Refinancing Needs (the ratio of Short-Term Debt over Total Assets). Table 2.A shows that the coefficient of this variable is negative and statistically significant. If Refinancing Needs increases in 1%, this firm decreases its Investment in 0.04%. The coefficient of the interaction of this variable with Crisis 2009 is negative and statistically significant. When the crisis arrives, maintaining everything else equal, an additional 1% increase of Refinancing Needs means an additional decrease in Investment that is by 0.07% greater than before. A firm in the 90% quantile of the distribution of Refinancing Needs in 2008 (i.e. Refinancing Needs = 0.7408) reduces its Investment in 2009 a 4.31% more than a firm in the 10% quantile (i.e. Refinancing Needs = 0.1201), maintained everything else equal.

To confirm the results obtained with the baseline specification [1], I perform some extended versions. Tables 2.A and 2.B show the results obtained with all additional regression equations. In column (1) I extend the interacted terms of Asset Tangibility and Refinancing Needs by their interactions with the dummy variables Crisis 2010 and Crisis 2011 that take value 1 if the year is 2010 and 2011, respectively and value 0 otherwise. The coefficients obtained are very similar to the coefficients obtained in the baseline equation [1]. The variable Asset Tangibility has positive and statistically significant coefficient. When I interact this variable with Crisis 2009, the coefficient is positive and statistically significant. The same pattern is maintained for the interaction with Crisis 2010 and Crisis 2011. The coefficient corresponding to Refinancing Needs is negative and statistically significant. The interaction with Crisis 2009 shows a negative and statistically significant coefficient, however, the interaction of Refinancing Needs with Crisis 2010 and 2011 are not statistically significant. It means that the Refinancing Needs is relevant, above all, at the onset of the crisis in 2009.

Column (2) of Tables 2.A and 2.B includes the results of a regression where the variables Asset Tangibility and Refinancing Needs are interacted with all the year dummies during the period 1991-2011. It can be observed that Asset Tangibility has a positive and statistically significant coefficient in 2009 and Refinancing Needs also keeps its negative and statistically significant coefficient in 2009.

To further check the robustness of the results I fix the values of Assets Tangibility and Refinancing Needs to the values taken in the year 2006. Then, I interact these fixed values with year dummies in two different ways. Simultaneously, I use the non-fixed values of Asset Tangibility and Refinancing Needs as control variables. The column (3) of Tables 2.A and 2.B provides the results of the regression where the fixed values of Asset Tangibility and Refinancing Needs are interacted with the dummies of years 2006-2011 (to see the effects in the years of the pre crisis and crisis period). As in prior specifications, the coefficient of the control variable Asset Tangibility is positive and statistically significant. The interaction between the level of Asset Tangibility in 2006 and the 2006-2011 year dummies is negative and statistically significant in 2006, not significant in 2007 and 2008, and positive and

	Baseline Specification	(1)	(2)	(3)	(4)
AT	0.0178 (0.0087)	0.0260 (0.0091)	0.0612 (0.0149)	0.0304 (0.0091)	0.0684 (0.0164)
RN	-0.0431 (0.0106)	-0.0405 (0.0109)	-0.0627 (0.0156)	-0.0314 (0.0114)	0.0234 (0.0184)

SOURCE: Author's elaboration.

YEAR DUMMY COEFFICIENTS IN THE BASELINE SPECIFICATION OF THE INVESTMENT EQUATION

CHART 1



SOURCE: Author's elaboration.

statistically significant in 2009, 2010 and 2011. The coefficient of the fixed value of Refinancing Needs interacted with year dummies is negative and statistically significant in 2009 and statistically not significant in 2010 and 2011. The specification in column (4) in Tables 2.A and 2.B interacts the values of the main independent variables in 2006 with all the year dummies 1991-2011 (to see the coefficients during the whole period of analyses). It can be seen that Asset Tangibility maintains its pattern being positive and significant in 2009.

As I mentioned before, the Investment equation includes year dummies in order to control for possible macroeconomic effects. Chart 1 shows the coefficients of the year dummies, obtained in the baseline specification of the Investment equation [1] during the period 1994-2010. Years 1991-1993 do not appear in the regression because some of the independent variables involve two lags (Growth of Sales). 2011 is the reference year omitted due to the inclusion of a constant in the regression. The effect of the crisis is clear.

Table 3 shows the quantitative differential effect of Asset Tangibility and Refinancing Needs on Investment at the beginning of the financial crisis in 2009. I provide results corresponding to the baseline specification of the Investment Equation in the column Baseline Specification. The following columns contain results of the different variations of the baseline specification [1]. The results of columns Baseline Specification, (1) and (2) are obtained by multiplying the coefficients of the interaction terms of Asset Tangibility and Refinancing Needs with the dummy variable Crisis 2009 by the difference of Asset Tangibility and Refinancing Needs in the 90th and the 10th level of their percentage distribution measured in 2008. The results of columns (3) and (4) are obtained by

multiplying the coefficients of the interaction terms of Asset Tangibility_{*i*2006} and Refinancing Needs_{*i*2006} with the year dummy variable in 2009 by the difference of Asset Tangibility and Refinancing Needs in the 90th and the 10th level of their percentage distribution measured in 2006. Column (4) shows a positive effect of the variable Refinancing Needs, but the coefficient of the interaction term is statistically not significant. The numbers in the parenthesis are obtained by multiplying the standard errors of the coefficients of interaction terms by the difference of Asset Tangibility and Refinancing Needs measured at the levels mentioned above.

The analysis demonstrates the detrimental effects of Refinancing Needs on Investment at the arrival of the crisis. This is consistent with the idea that financial constraints limit the access to external financing. Due to the shortage of liquidity and funding, the companies cannot fulfill their short-term obligations. They direct all the resources available to pay the pending debt. This limits their capacity to invest, or, in the worst of the cases, these companies are pressed to desinvest.

The control variable Growth of Sales is worth being mentioned. I include this variable as a proxy of Tobin's Q, a typical control variable used in investment equations. Since my dataset does not allow me to compute the Tobin's Q, I use the Growth of Sales as an approximation. This variable is not significant in its first lag, however its second lag shows positive and statistically significant coefficients in the baseline specification [1] and its variations. Growth of Sales increases firms' investment.

Charts A.1 and A.2 in the Appendix show the coefficients of the interaction terms of Asset Tangibility and Refinancing Needs with the year dummies from the period 1991-2011 obtained in the variation [2] of the baseline specification of the Investment equation. The differential effect of Asset Tangibility and Refinancing Needs on Investment during the crisis period is visually clear.

In all of the regressions mentioned above I control for fixed effects at the individual level of each firm, but I do not control for fixed effects at the sectorial level. To further check the robustness, Table A.2 in the Appendix provides the results obtained in all of the versions of the Investment equation where I include also the interaction terms of the sector dummies with the year dummy variables. The sign and significance of the coefficients is maintained stable for most of the variables. The coefficient of the interaction term of Asset Tangibility with the dummy variable Crisis 2009 is not significant in the baseline specification of the Investment equation, but it is significant in most of its variations.

6 Results for the Employment Growth Equation

Tables 4.A and 4.B present the results obtained in the baseline specification of the Employment Growth equation and its variations. Column Baseline Specification in Table 4.A contains the results of the baseline specification of the Employment Growth equation. Column (1) shows the estimated coefficients of the regression where Asset Tangibility (AT), Refinancing Needs (RN) and Temporary Employment (TE) are interacted with Crisis 2010 and Crisis 2011. Column (2) of the Tables 4.A and 4.B contains the estimated coefficients of the regression in which AT, RN and TE are interacted with all the year dummies from 1991 to 2011. Columns (3) and (4) of the Tables 4.A and 4.B display the results of the regressions in which the values of Asset Tangibility, Refinancing Needs and Temporary Employment measured in 2006 (AT_{*i*2006}, RN_{*i*2006}, TE_{*i*2006}) are interacted with the year dummies 2006-2011 [column (3)] and 1991-2011 [column (4)]. Table 4.B shows the coefficients of the interaction terms of Asset Tangibility, Refinancing Needs and Temporary Employment with the year dummy variables. Similar to Table 2.B, I show the results for the

EMPLOYMENT GROWTH EQUATION

TABLE 4.A

	Baseline specification	(1)	(2)	(3)	(4)
Asset Tangibility	0.0151* (0.0084)	0.0164* (0.0086)	0.0563*** (0.0175)	0.0176* (0.0090)	0.0183** (0.0092)
Crisis 2009*AT	-0.0085 (0.0136)	-0.0111 (0.0140)			
Crisis 2010*AT		-0.0147 (0.0137)			
Crisis 2011*AT		-0.0041 (0.0143)			
Refinancing Needs	0.0507*** (0.0173)	0.0519*** (0.0174)	0.0396* (0.0220)	0.0839*** (0.0192)	0.0834*** (0.0192)
Crisis 2009*RN	-0.0210 (0.0143)	-0.0264* (0.0147)			
Crisis 2010*RN		-0.0208 (0.0152)			
Crisis 2011*RN		-0.0219 (0.0157)			
Temporary Employment	-0.0889*** (0.0076)	-0.0874*** (0.0077)	-0.0453*** (0.0167)	-0.0805*** (0.0087)	-0.0827*** (0.0088)
Crisis 2009*TE	-0.0795*** (0.0190)	-0.0883*** (0.0193)			
Crisis 2010*TE		-0.0302 (0.0219)			
Crisis 2011*TE		-0.0469** (0.0228)			
Growth of Sales	0.0559*** (0.0043)	0.0559*** (0.0043)	0.0552*** (0.0043)	0.0575*** (0.0050)	0.0576*** (0.0050)
Paying Dividends	0.0034 (0.00398)	0.0034 (0.0039)	0.0030 (0.0039)	0.0008 (0.0043)	0.0006 (0.0043)
Return on Assets	0.0017 (0.0025)	0.0017 (0.0025)	0.0017 (0.0025)	0.0025 (0.0028)	0.0025 (0.0028)
Cash Holdings	0.0315*** (0.0108)	0.0313*** (0.0108)	0.0304*** (0.0108)	0.0418*** (0.0119)	0.0419*** (0.0118)
Own Funds	0.0430*** (0.0157)	0.0416*** (0.0158)	0.0395** (0.0158)	0.0555*** (0.0173)	0.0555*** (0.0173)
Long-Term Debt	0.0374*** (0.0102)	0.0365*** (0.0102)	0.0353*** (0.0102)	0.0511*** (0.0111)	0.0508*** (0.0111)
Constant	-0.0802*** (0.0164)	-0.0648*** (0.0181)	-0.0573*** (0.0182)	-0.0746*** (0.0208)	-0.0863*** (0.0241)

SOURCE: Author's elaboration.

period 1999-2011. In all of the regressions I control for fixed effects at the individual firm level and I include year dummies. The robust standard errors are provided in parenthesis. The statistical significance is: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

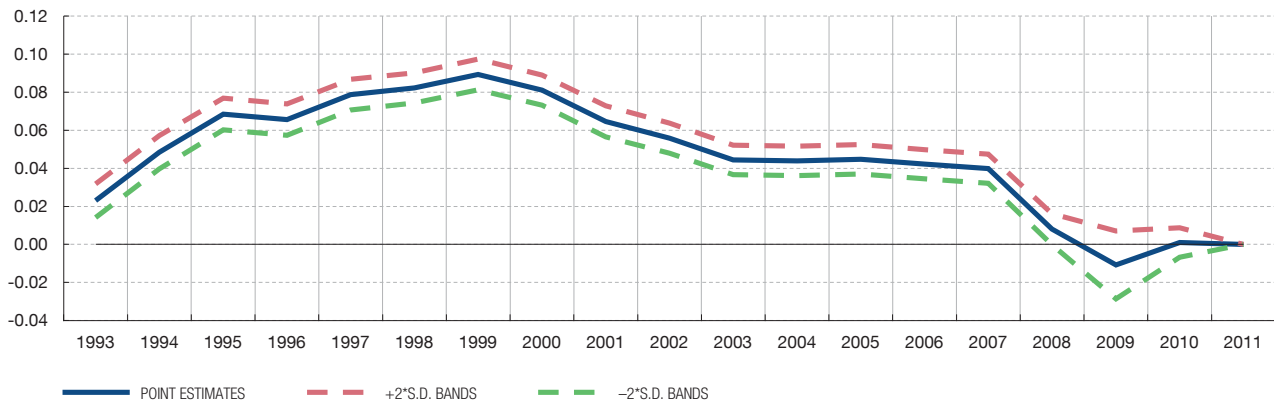
Asset Tangibility shows a positive and statistically significant coefficient. In normal circumstances, a 1% increase of Asset Tangibility allows firms to increase Employment

	(2)			(3)			(4)		
	AT _{it}	RN _{it}	TE _{it}	AT _{t2006}	RN _{t2006}	TE _{t2006}	AT _{t2006}	RN _{t2006}	TE _{t2006}
1995	-0.0426** (0.0203)	0.0142 (0.0190)	-0.0117 (0.0193)				-0.0259 (0.0273)	0.0462* (0.0268)	-0.0333 (0.0376)
1996	-0.0569*** (0.0200)	0.0102 (0.0188)	-0.0111 (0.0200)				-0.0281 (0.0270)	0.0372 (0.0273)	0.00960 (0.0380)
1997	-0.0145 (0.0204)	0.0240 (0.0192)	-0.0158 (0.0203)				0.00581 (0.0266)	0.0255 (0.0262)	0.0269 (0.0371)
1998	-0.0405** (0.0205)	0.0192 (0.0193)	-0.0289 (0.0199)				-0.0275 (0.0260)	0.0436* (0.0260)	-0.0367 (0.0346)
1999	-0.0417* (0.0213)	0.0377* (0.0199)	-0.0240 (0.0210)				0.0190 (0.0257)	0.0799*** (0.0258)	0.00849 (0.0351)
2000	-0.0506** (0.0210)	0.0330* (0.0193)	-0.0343 (0.0209)				-0.0329 (0.0257)	0.0455* (0.0254)	-0.00199 (0.0354)
2001	-0.0243 (0.0217)	0.00803 (0.0206)	-0.0785*** (0.0217)				-0.0111 (0.0262)	0.0450* (0.0259)	-0.0189 (0.0355)
2002	-0.0289 (0.0208)	0.0294 (0.0202)	-0.0669*** (0.0212)				-0.0277 (0.0253)	0.0508** (0.0253)	-0.00554 (0.0336)
2003	-0.0377* (0.0207)	0.00702 (0.0201)	-0.0692*** (0.0209)				-0.00609 (0.0247)	0.0412* (0.0246)	0.00667 (0.0328)
2004	-0.0161 (0.0205)	0.0117 (0.0198)	-0.0722*** (0.0217)				-0.0122 (0.0248)	0.0410* (0.0249)	0.00588 (0.0329)
2005	-0.0412* (0.0211)	-0.00245 (0.0206)	-0.0752*** (0.0230)				-0.0340 (0.0249)	0.0258 (0.0247)	0.0340 (0.0335)
2006	-0.0637*** (0.0209)	0.0175 (0.0205)	-0.0816*** (0.0228)	-0.0279** (0.0139)	0.0219 (0.0139)	0.0358** (0.0168)	-0.0465* (0.0246)	0.0603** (0.0248)	0.0403 (0.0328)
2007	-0.0571*** (0.0214)	-0.0136 (0.0206)	-0.101*** (0.0235)	-0.0225 (0.0142)	-0.0312** (0.0142)	-0.0438*** (0.0170)	-0.0408* (0.0247)	0.00735 (0.0249)	-0.0400 (0.0328)
2008	-0.0619*** (0.0220)	-0.0116 (0.0220)	-0.126*** (0.0263)	-0.0302** (0.0152)	-0.0478*** (0.0160)	-0.0595*** (0.0195)	-0.0484* (0.0255)	-0.00930 (0.0261)	-0.0564* (0.0342)
2009	-0.0561*** (0.0213)	-0.0209 (0.0210)	-0.161*** (0.0257)	-0.00925 (0.0157)	-0.0372** (0.0164)	-0.0853*** (0.0189)	-0.0274 (0.0257)	0.00133 (0.0263)	-0.0825** (0.0339)
2010	-0.0593*** (0.0210)	-0.0146 (0.0214)	-0.101*** (0.0276)	-0.0281* (0.0164)	-0.0329** (0.0166)	-0.0686*** (0.0201)	-0.0462* (0.0262)	0.00550 (0.0266)	-0.0660* (0.0346)
2011	-0.0487** (0.0214)	-0.0151 (0.0217)	-0.117*** (0.0281)	-0.00708 (0.0165)	-0.0326* (0.0175)	-0.0532** (0.0216)	-0.0251 (0.0262)	0.00586 (0.0270)	-0.0507 (0.0356)

SOURCE: Author's elaboration.

Growth by 0.02%. The coefficient of the interaction term of Asset Tangibility with Crisis 2009 is statistically not significant. Asset Tangibility increases firms' Employment Growth in the environment without financial constraints. However, this variable does not provide any value to Employment Growth at the onset of the crisis.

Refinancing Needs has a positive and statistically significant effect on Employment Growth. A 1% increase of Refinancing Needs allows firms to increase Employment Growth by 0.05%. The coefficient of the interacted term of Refinancing Needs with Crisis 2009 is statistically not significant.



SOURCE: Author's elaboration.

Similar to the variable Asset Tangibility, in normal circumstances Refinancing Needs may help firms to increase Employment Growth. Firms benefit from short-term funding. When the crisis arrives, Refinancing Needs has no additional value for Employment Growth.

Temporary Employment emerges as other explanatory variable in the Employment Growth equation. The coefficient of Temporary Employment is negative and statistically significant. A 1% increase of Temporary Employment means that firm's Employment Growth decreases by 0.09%. At the onset of the crisis, the detrimental pattern of Temporary Employment is maintained. The coefficient of the interaction term of Temporary Employment with Crisis 2009 is negative and statistically significant. All other things equal, an additional 1% increase of Temporary Employment in 2009 decreases the Employment Growth by 0.08% more than before the crisis. The quantitative differential effect of Temporary Employment on Employment Growth of two firms located at 90% and 10% quantile of the percentage distribution of the Temporary Employment in 2008 (i.e. $TE=50\%$ and $TE=0\%$, respectively) is -3.98% .

Chart 2 shows the evolution of the year dummy coefficients obtained in the baseline specification of the Employment Growth equation during the period 1993-2010. Years 1991 and 1992 do not appear in the regression because of the definition of the dependent variable Employment Growth. 2011 is the reference year omitted due to the inclusion of a constant in the regression.

Table 5 shows the quantitative differential effect of Temporary Employment on Employment Growth at the beginning of the financial crisis in 2009. The results of the columns Baseline Specification, (1) and (2) are obtained by multiplying the coefficient of the interaction term of Temporary Employment with the dummy variable Crisis 2009 by the difference of Temporary Employment in the 90th and the 10th level of its percentage distribution measured in 2008. The results of the columns (3) and (4) are obtained by multiplying the coefficient of the interaction term of the fixed value of Temporary Employment i2006 with the year dummy variable in 2009 by the difference of Temporary Employment at the 90th and the 10th level of the percentage distribution measured in 2006. The numbers in parenthesis are obtained by multiplying the standard errors of the corresponding coefficients by the difference of Temporary Employment measured at the levels mentioned above.

The control variable Growth of Sales, interpreted as a proxy of Tobin's Q, is positive and statistically significant in the baseline specification and also in all the variations of the Employment Growth equation.

	Baseline Specification	(1)	(2)	(3)	(4)
TE	-0.03975 (0.0095)	-0.04415 (0.00965)	-0.0805 (0.01285)	-0.0464 (0.01029)	-0.0449 (0.01845)

SOURCE: Author's elaboration.

The analysis shows that Asset Tangibility, Refinancing Needs and Temporary Employment are significantly correlated with firms' Employment Growth. However, opposite to what I found for Investment, Asset Tangibility and Refinancing Needs do not produce a clear differential effect across firms when the crisis arrives. Temporary Employment does, allowing for a much richer destruction of employment in the crisis years.

Charts A.3, A.4 and A.5, included in the Appendix, show the coefficients of the interaction terms of Asset Tangibility, Refinancing Needs and Temporary Employment, respectively, with the year dummies from the period 1991-2011 obtained in the variation [2] of the baseline specification of the Employment Growth equation. The differential effect of Refinancing Needs and Temporary Employment on Employment Growth (Charts A.4 and A.5, respectively) during the crisis period is evident. Chart A.3 does not show a clear effect of Asset Tangibility on Employment Growth.

In all of the regressions mentioned above I control for fixed effects at the individual level of each firm, but I do not control for fixed effects at the sartorial level. To further check the robustness, Table A.3 in the Appendix provides the results obtained in all of the versions of the Employment Growth equation in which I include also the interaction terms of the sector dummies with the year dummy variables. The sign and significance of the coefficients is maintained stable for most of the variables. The coefficient of Asset Tangibility is not significant in the baseline specification of the Employment Growth equation, but it is significant in most of its variations.

7 Conclusions

How do firms "respond" to disturbances in the credit market? What are the real effects of firms' financial constraints? Which feature makes firms more robust or more vulnerable to changes in these constraints?

I design a strategy that helps address the previous questions with Spanish firms's data. I identify the year 2009 as the onset of the financial crisis accompanied by the credit shortage. I define two baseline regression equations where I try to see the differential effect of Refinancing Needs, Asset Tangibility and Temporary Employment on Investment and Employment Growth at the beginning of the crisis.

The variable Asset Tangibility presents positive and statistically significant coefficients for Investment and Employment Growth. This result confirms the initial hypothesis stated also in Almeida and Campello (2007). Asset Tangibility supports corporate investment serving as collaterals and mitigating the contracting problems. Firms with higher Asset Tangibility can guarantee their repayment promises and are perceived as more reliable and solvent. At the onset of the crisis, when financial constraints hit the credit supply, high Asset Tangibility is an important aid to obtain external financial resources. Maintaining

everything else equal, those firms that in 2008 have Asset Tangibility higher than 67% can increase Investment in 2009 by 1.78 percentage points more than firms with less than 1.96% of Asset Tangibility. However, Asset Tangibility does not explain a differential behavior of Employment Growth at the arrival of the crisis.

Refinancing Needs represents repayment obligations to be covered within one year period. It is a useful financial instrument that allows firms to satisfy their urgent financial needs. However, the results obtained point out a negative and statistically significant effect of Refinancing Needs on Investment. If the firms rely more on short-term funding, they have to fulfill their debt obligations in a short-time period. Therefore, they direct all available resources to the repayment of the debt, slowing down the investment growth. Moreover, this negative effect is maintained when the crisis arrives. Financial constraints do not permit firms to obtain new resources, neither can they roll over the pending debt. Therefore, those firms with high Refinancing Needs are obliged to invest less or to disinvest in order to fulfill their obligations. Other things equal, those firms that rely more heavily on short-term funding and have a high fraction of Refinancing Needs in 2008 (more than 74.08%) have to cut the Investment by 4.31% more than firms with less than 12.01% of Refinancing Needs in 2008. This result is greater than the result found in Almeida *et al.* (2011). They state that US firms with a higher fraction of long-term debt scheduled to mature at the beginning of the crisis cut their investment to capital ratio by 2% more than otherwise similar firms which debt was scheduled to mature after 2008.

Refinancing Needs plays a relevant role for Employment Growth. In normal circumstances, the effect on Employment Growth is positive and statistically significant. In the environment with no financial limits, the short-term funding may help companies to obtain resources necessary to employ more workers. When the crisis starts, Refinancing Needs is not significant to explain a differential behaviour of Employment Growth.

Employment Growth is also explained by Temporary Employment, defined as the ratio of Average Temporary Employment over Average Total Employment. This variable presents a negative and statistically significant coefficient before and at the outset of the crisis. Firms in which Temporary Employment is higher than 50% in 2008 decrease Employment Growth by 3.98% more than firms with no Temporary Employment, maintaining everything else equal. This result agrees with Caggese and Cuñat (2008) who demonstrate that financially constrained firms use more fixed-term workers and make them absorb a large fraction of total employment volatility.

The results obtained are not only statistically significant, they also have important economic implications. They suggest that managers can design optimal corporate policies where the appropriate levels of Asset Tangibility, Refinancing Needs and Temporary Employment may help to moderate negative effects of financial constraints on Investment and Employment Growth.

APPENDIX

Table A.1 contains the summary statistics mean, standard deviation, percentile distribution and the number of observations of the variables Investment, Employment Growth, Refinancing Needs, Asset Tangibility and Temporary Employment during the period 2006-2011.

Tables A.2 and A.3 contain results obtained in all the variations of the Investment and Employment Growth equations, respectively. In all of the regressions I include the interaction terms of the sector dummy variables with the year dummies. I do not report the coefficients of the interaction terms due to the lack of space.

Charts A.1 and A.2 show the coefficients of the interaction terms of Asset Tangibility and Refinancing Needs with the year dummy variables from the period 1991-2011 obtained in

DESCRIPTIVE STATISTICS

TABLE A.1

	Percentiles							Obs.
	Mean	Std. Dev.	10%	25%	50%	75%	90%	
Investment	0.052	0.197	-0.154	-0.049	0.039	0.143	0.275	97
2006	0.0733	0.1982	-0.1242	-0.0242	0.0574	0.1578	0.2933	5,183
2007	0.0569	0.1921	-0.1288	-0.0376	0.0437	0.1427	0.2680	4,898
2008	-0.0130	0.2031	-0.2472	-0.1200	-0.0168	0.0845	0.2171	4,646
2009	-0.0226	0.1867	-0.2293	-0.1114	-0.0228	0.0624	0.1751	4,436
2010	0.0180	0.1723	-0.1606	-0.0630	0.0117	0.0955	0.2091	5,241
2011	-0.0078	0.1637	-0.1773	-0.0800	-0.0081	0.0659	0.1716	4,513
Employment Growth								
2006	0.0115	0.1770	-0.1335	-0.0357	0.0000	0.0720	0.1625	5,183
2007	0.0100	0.1720	-0.1398	-0.0377	0.0000	0.0725	0.1666	4,898
2008	-0.0187	0.1799	-0.1967	-0.0741	0.0000	0.0511	0.1431	4,646
2009	-0.0629	0.1719	-0.2578	-0.1278	-0.0354	0.0000	0.0853	4,436
2010	-0.0320	0.1616	-0.1911	-0.0870	-0.0053	0.0286	0.1054	5,241
2011	-0.0204	0.1512	-0.1680	-0.0690	0.0000	0.0347	0.1151	4,513
Refinancing Needs								
2006	0.4446	0.2266	0.1429	0.2664	0.4391	0.6135	0.7598	5,982
2007	0.4348	0.2316	0.1282	0.2500	0.4232	0.6096	0.7573	6,165
2008	0.4158	0.2288	0.1201	0.2295	0.4004	0.5799	0.7408	6,546
2009	0.3960	0.2274	0.1114	0.2124	0.3720	0.5579	0.7264	6,857
2010	0.3984	0.2258	0.1154	0.2171	0.3764	0.5564	0.7255	7,065
2011	0.3883	0.2266	0.1087	0.2075	0.3607	0.5479	0.7178	5,827
Asset Tangibility								
2006	0.2553	0.2312	0.0186	0.0656	0.1901	0.3795	0.6081	5,982
2007	0.2574	0.2385	0.0158	0.0629	0.1859	0.3850	0.6340	6,165
2008	0.2930	0.2474	0.0196	0.0841	0.2350	0.4468	0.6722	6,546
2009	0.2924	0.2463	0.0197	0.0812	0.2362	0.4512	0.6658	6,857
2010	0.2743	0.2416	0.0169	0.0678	0.2128	0.4236	0.6393	7,065
2011	0.2678	0.2417	0.0139	0.0638	0.2021	0.4158	0.6364	5,827
Temporary Employment								
2006	0.2058	0.2331	0.0000	0.0194	0.1304	0.3000	0.5443	5,982
2007	0.1878	0.2202	0.0000	0.0000	0.1200	0.2727	0.5000	6,165
2008	0.1856	0.2221	0.0000	0.0000	0.1111	0.2640	0.5000	6,546
2009	0.1652	0.2140	0.0000	0.0000	0.0879	0.2340	0.4706	6,857
2010	0.1512	0.2020	0.0000	0.0000	0.0769	0.2089	0.4259	7,065
2011	0.1411	0.1942	0.0000	0.0000	0.0714	0.1915	0.3936	5,827

SOURCE: Author's elaboration.

	Baseline Specification	(1)	(2)	(3)	(4)
Asset Tangibility	0.1080*** (0.0112)	0.1040*** (0.0115)	0.0577*** (0.0218)	0.0927*** (0.0117)	0.0905*** (0.0120)
AT*Crisis 2009	0.0132 (0.0142)	0.0210 (0.0151)	0.0695*** (0.0253)	0.0304* (0.0169)	0.0837*** (0.0314)
AT*Crisis 2010		0.0156 (0.0151)	0.0640** (0.0251)	0.0165 (0.0177)	0.0696** (0.0317)
AT*Crisis 2011		0.0398*** (0.0154)	0.0881*** (0.0253)	0.0392** (0.0180)	0.0922*** (0.0320)
Refinancing Needs	-0.0453** (0.0221)	-0.0477** (0.0222)	-0.0247 (0.0277)	-0.0299 (0.0240)	-0.0356 (0.0241)
RN*Crisis 2009	-0.0612*** (0.0173)	-0.0549*** (0.0179)	-0.0822*** (0.0259)	-0.0322* (0.0192)	0.0638** (0.0308)
RN*Crisis 2010		0.0153 (0.0190)	-0.0115 (0.0267)	0.0070 (0.0195)	0.1020*** (0.0308)
RN*Crisis 2011		0.0347* (0.0190)	0.0083 (0.0265)	-0.0095 (0.0200)	0.0855*** (0.0311)
Growth of Sales (1st lag)	0.0009 (0.0049)	0.0009 (0.0049)	0.0014 (0.0049)	0.0058 (0.0055)	0.0066 (0.0055)
Growth of Sales (2nd lag)	0.0133*** (0.0046)	0.0134*** (0.0047)	0.0132*** (0.0047)	0.0154*** (0.0052)	0.0157*** (0.0052)
Paying Dividends	0.0116* (0.0060)	0.0117* (0.0060)	0.0116* (0.0060)	0.0137** (0.0062)	0.0133** (0.0062)
Return on Assets	-0.0034 (0.0032)	-0.0035 (0.0032)	-0.0037 (0.0032)	0.0004 (0.0035)	0.0005 (0.0035)
Cash Holdings	-0.0186 (0.0145)	-0.0187 (0.0145)	-0.0193 (0.0145)	0.0064 (0.0158)	0.0063 (0.0158)
Own Funds	0.2800*** (0.0200)	0.2820*** (0.0201)	0.2820*** (0.0201)	0.2570*** (0.0214)	0.2600*** (0.0215)
Long-Term Debt	-0.0539*** (0.0123)	-0.0536*** (0.0123)	-0.0530*** (0.0123)	-0.0413*** (0.0132)	-0.0395*** (0.0132)
Constant	-0.1130 (0.0693)	-0.1380** (0.0690)	-0.1370** (0.0692)	-0.1480** (0.0737)	-0.2000*** (0.0749)
Observations	65.146	65.146	65.146	48.306	48.306
R-squared	0.255	0.255	0.257	0.219	0.221

SOURCE: Author's elaboration.

the variation [2] of the Investment equation. I present the results for the period 1991-2011. The coefficients corresponding to the period 1991-1993 do not appear because some of the independent variables involve two lags (Growth of Sales). 1994 is the reference year omitted due to the inclusion of a constant in the regression.

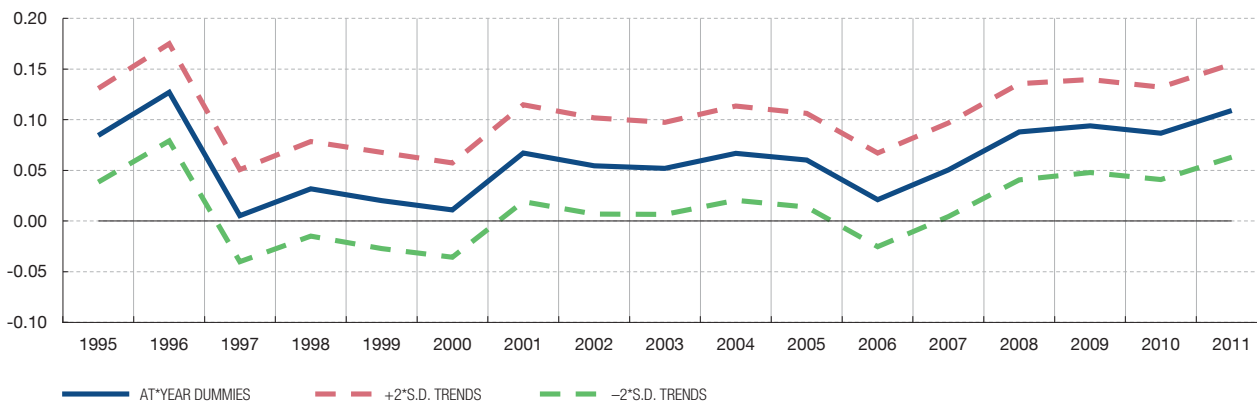
Charts A.3, A.4 and A.5 show the coefficients of the interaction terms of Asset Tangibility, Refinancing Needs and Temporary Employment, respectively, with the year dummy variables from the period 1991-2011 obtained in the variation [2] of the Employment Growth equation. Similarly to the Charts A.1 and A.2, I present the results for the period 1991-2011.

	Baseline Specification	(1)	(2)	(3)	(4)
Asset Tangibility	0.0129 (0.0084)	0.0154* (0.0086)	0.0548*** (0.0191)	0.0175* (0.0091)	0.0198** (0.0092)
AT*Crisis 2009	-0.0128 (0.0142)	-0.0177 (0.0146)	-0.0673*** (0.0232)	-0.0166 (0.0165)	-0.0367 (0.0295)
AT*Crisis 2010		-0.0198 (0.0145)	-0.0684*** (0.0231)	-0.0427** (0.0173)	-0.0627** (0.0299)
AT*Crisis 2011		-0.0144 (0.0156)	-0.0625*** (0.0238)	-0.0241 (0.0177)	-0.0438 (0.0301)
Refinancing Needs	0.0518*** (0.0173)	0.0532*** (0.0174)	0.0413* (0.0221)	0.0848*** (0.0192)	0.0849*** (0.0192)
RN*Crisis 2009	-0.0217 (0.0146)	-0.0269* (0.0150)	-0.0194 (0.0213)	-0.0377** (0.0168)	0.0005 (0.0262)
RN*Crisis 2010		-0.0230 (0.0155)	-0.0151 (0.0217)	-0.0340** (0.0168)	0.0041 (0.0263)
RN*Crisis 2011		-0.0166 (0.0160)	-0.0081 (0.0220)	-0.0231 (0.0176)	0.0150 (0.0267)
Temporary Employment	-0.0911*** (0.0077)	-0.0900*** (0.0077)	-0.0455*** (0.0171)	-0.0818*** (0.0088)	-0.0842*** (0.0089)
TE*Crisis 2009	-0.0832*** (0.0196)	-0.0897*** (0.0200)	-0.1660*** (0.0265)	-0.0827*** (0.0196)	-0.0697** (0.0350)
TE*Crisis 2010		-0.0217 (0.0229)	-0.0964*** (0.0286)	-0.0662*** (0.0206)	-0.0533 (0.0355)
TE*Crisis 2011		-0.0359 (0.0241)	-0.1100*** (0.0294)	-0.0468** (0.0231)	-0.0341 (0.0371)
Growth of Sales	0.0548*** (0.0043)	0.0548*** (0.0043)	0.0541*** (0.0043)	0.0566*** (0.0050)	0.0568*** (0.0050)
Paying Dividends	0.0035 (0.0039)	0.0035 (0.0039)	0.0032 (0.0039)	0.0012 (0.0043)	0.0009 (0.0043)
Return on Assets	0.0020 (0.0025)	0.0020 (0.0025)	0.0021 (0.0025)	0.0029 (0.0028)	0.0028 (0.0028)
Cash Holdings	0.0292*** (0.0108)	0.0291*** (0.0108)	0.0278*** (0.0108)	0.0394*** (0.0118)	0.0395*** (0.0118)
Own Funds	0.0451*** (0.0157)	0.0440*** (0.0157)	0.0425*** (0.0158)	0.0586*** (0.0172)	0.0589*** (0.0173)
Long-Term Debt	0.0384*** (0.0102)	0.0379*** (0.0102)	0.0372*** (0.0102)	0.0528*** (0.0111)	0.0529*** (0.0111)
Constant	-0.0785 (0.0644)	-0.0637 (0.0652)	-0.0624 (0.0653)	-0.0603 (0.0712)	-0.0721 (0.0723)
Observations	78.383	78.383	78.383	54.809	54.809
R-squared	0.261	0.261	0.263	0.204	0.205

SOURCE: Author's elaboration.

INTERACTION COEFFICIENTS OF AT WITH THE YEAR DUMMIES IN THE VARIATION [2]
OF THE INVESTMENT EQUATION

CHART A.1



SOURCE: Author's elaboration.

INTERACTION COEFFICIENTS OF RN WITH THE YEAR DUMMIES IN THE VARIATION [2]
OF THE INVESTMENT EQUATION

CHART A.2



SOURCE: Author's elaboration.

INTERACTION COEFFICIENTS OF AT WITH THE YEAR DUMMIES IN THE VARIATION [2]
OF THE EMPLOYMENT GROWTH EQUATION

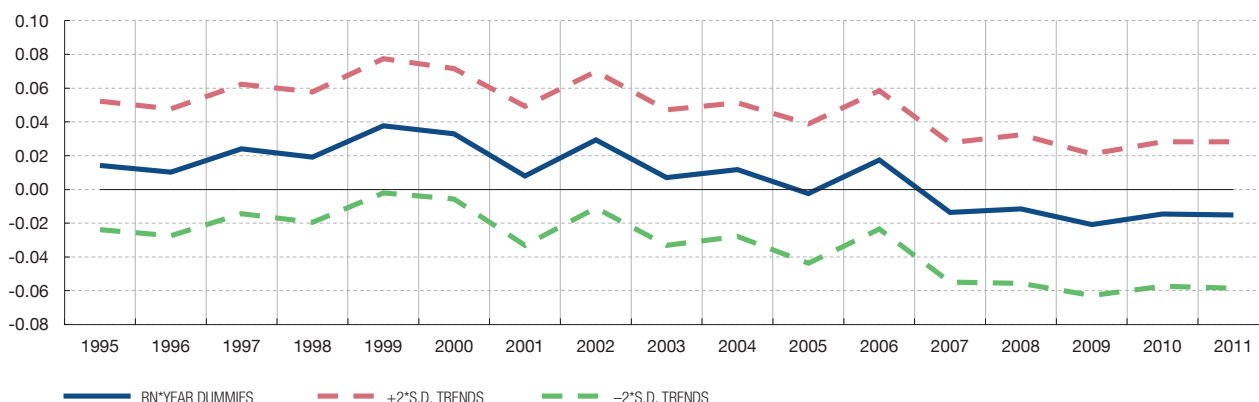
CHART A.3



SOURCE: Author's elaboration.

INTERACTION COEFFICIENTS OF RN WITH THE YEAR DUMMIES IN THE VARIATION [2]
OF THE EMPLOYMENT GROWTH EQUATION

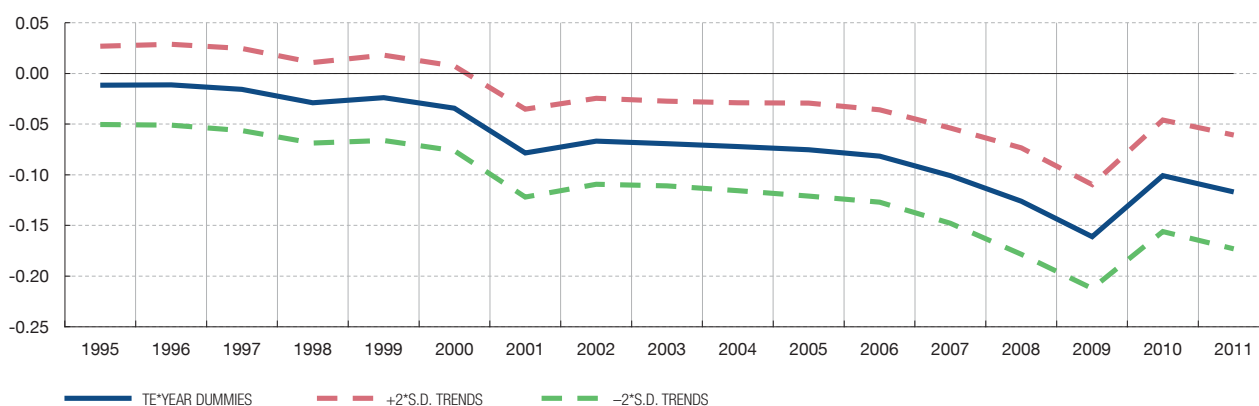
CHART A.4



SOURCE: Author's elaboration.

INTERACTION COEFFICIENTS OF TE WITH THE YEAR DUMMIES IN THE VARIATION [2]
OF THE EMPLOYMENT GROWTH EQUATION

CHART A.5



SOURCE: Author's elaboration.

REFERENCES

- ALMEIDA, H., and M. CAMPELLO (2007). "Financial Constraints, Asset Tangibility, and Corporate Investment", *Review of Financial Studies*, 20(5), pp. 1429-1460.
- ALMEIDA, H., M. CAMPELLO, B. LARANJEIRA, and S. WEISBENNER (2011). "Corporate Debt Maturity and the Real Effects of the 2007 Credit Crisis", *Critical Financial Review*, 1, pp. 3-58.
- BANCO DE ESPAÑA (2010). *Annual Report, 2009*, pp. 149-169, electronic version: <http://www.bde.es/jf/webbde/SES/Secciones/Publicaciones/PublicacionesAnuales>.
- BENTOLILA, S., M. JANSEN, G. JIMÉNEZ, and S. RUANO (2013). "When Credit Dries Up: Job Losses in the Great Recession", CEMFI, mimeo.
- CAGGESE, A., and V. CUÑAT (2008). "Financing Constraints and Fixed-Term Employment Contracts", *Economic Journal*, 118, pp. 2013-2046.
- CAMPELLO, M., J. GRAHAM, and C. HARVEY (2010). "The Real Effects of Financial Constraints: Evidence from a Financial Crisis", *Journal of Financial Economics*, 97(3), pp. 470-487.
- CARBÓ VALVERDE, S., F. RODRÍGUEZ FERNÁNDEZ, and G. UDELL (2008). *Bank lending, financing constraints and SME investment*, Federal Reserve Bank of Chicago, WP 2008-4.
- DUCHIN, R., O. OZBAS, and B. A. SENSOY (2010). "Costly External Finance, Corporate Investment, and the Subprime Mortgage Credit Crisis", *Journal of Financial Economics*, 97(3), pp. 418-435.
- GARCÍA-APPENDINI, M. E., and J. MONTORIOL-GARRIGA (2013). "Firms as Liquidity Providers: Evidence from the 2007-2008 Financial Crisis", *Journal of Financial Economics*, 109, pp. 272-291.
- GARICANO, L., and C. STEINWENDER (2013). *Survive Another Day: Does Uncertain Financing Affect the Composition of Investment?*, CEP Discussion Paper No. 1188.
- GILCHRIST, S., and C. HIMMELBERG (1995). "Evidence on the Role of Cash Flow for Investment", *Journal of Monetary Economics*, 36, pp. 541-572.
- HIMMELBERG, C., and B. PETERSEN (1994). "R&D and Internal Finance: A Panel Study of Small Firms in High-Tech Industries", *Review of Economics and Statistics*, 76, pp. 38-51.

- IVASHINA, V., and D. SHARFSTEIN (2010). "Bank Lending during the Financial Crisis of 2008", *Journal of Financial Economics*, 97, pp. 319-338.
- KIYOTAKI, N., and J. MOORE (1997). "Credit Cycles", *Journal of Political Economy*, 10, pp. 211-248.
- MOLINA PÉREZ, J. C. (2012). "Trade Credit and Credit Crunches: Evidence for Spanish Firms from the Global Banking Crisis", CEMFI Master Thesis, *Estabilidad Financiera*, 23, Banco de España, pp. 57-70.
- TONG, H., and S. WEI (2008). *Real Effects of the Subprime Mortgage Crisis: Is it a Demand or a Finance Shock?*, NBER Working Paper No. 14205.
- WHITED, T. (1992). "Debt, Liquidity Constraints, and Corporate Investment: Evidence from Panel Data", *Journal of Finance*, 47, pp. 425-460.