

# **Credit crunch and firm growth during the recent financial crisis:**

## **What is the role of banking structure?**

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### **(Preliminary Version)**

#### **Abstract**

This paper explores the effects of bank credit on firm growth before and after the recent financial crisis taking also into account the role of banking concentration. The econometric panel method of fixed effects is used on a large sample of 2086 firms operating in the Euro-area (17) and Lithuania for the period 2005-2011. The main results of this paper indicate a great dependence of firm performance on credit growth. However, this relationship does not exist during the recent financial crisis where a credit crunch appears. Moreover, our findings reveal that banking concentration has a negative influence on firm growth.

**Keywords:** Credit Crunch, Firm Growth, Banking Concentration, Financial Crisis

## **1. Introduction**

The recent financial crisis was the most severe in decades and its cost has been high. GDP contracted by about 3.5% in the OECD area as a whole in 2009 and unemployment reached close to 9% on average (OECD, 2012). The crisis had a strong negative impact on real economic performance. The weak economic recovery and the credit crunch continued to take their toll on firm performance in terms of entry, growth and survival. The bank credit crunch following the recent financial crisis may constitute the main constraining factor for real economic activity.

The investigation of firm growth is significant for different reasons. First of all, the relevant literature has particularly emphasized the contribution of growing firms to job creation (e.g. Wagner, 1992). A positive firm growth rate implies the creation of new jobs, while a negative one reveals a destruction of jobs. A reference study in this discussion is undertaken by Birch (1979) who finds that new business formation and growth of particularly small businesses constitute the main processes of job generation in the US-economy. This study based on longitudinal firm-level data found a remarkable echo in the political scene and motivated subsequent empirical academic research for the USA and other countries. Moreover, firms with higher growth rates tend to exhibit a greater likelihood to survive (Fotopoulos and Louri, 2000). Also, increased firm growth rates in a specific industry may increase the input-output flows in other industries, affecting general economic development (Penrose, 1959). Furthermore, the objective of firm growth fosters the introduction of innovation and new technologies (Pagano and Schivardi, 2003).

The main objective of this paper is to explore the effects of credit crunch on firm growth during the recent financial crisis. Firm growth seems to have been severely

affected with negative repercussions in output and employment in most European countries. We would like to examine if this impact takes different dimensions (and signs) depending on different structural characteristics of the banking sector. More particularly, the proposed research is intended to examine how the credit crunch - firm growth nexus differs between banking sectors which are more/less concentrated.

Even though there is some published research on the effects of credit crunch on real economic activity, only a limited number of studies have examined these issues in times of crises (OECD, 2012; ECB, 2012). In this context, the present paper is a first attempt to investigate the linkages of firm growth to credit crunch in Europe during the recent financial crisis.

The paper is structured as follows: section 2 reviews the relevant literature; section 3 describes the data, the sample and the methodology used; section 4 presents the main results of the empirical analysis; and section 5 summarizes the main conclusions.

## **2. Past Evidence**

### **2.1 Credit Crunch: Credit Supply vs Credit Demand**

A bank credit crunch is defined as a significant leftward shift in the supply curve for bank loans (Bernanke and Lown, 1991). In other words, a credit crunch appears if there is a significant negative change in loan supply between two time periods (Berger and Udell, 1994). However, during a recession, a credit crunch could be the result of reduced demand for credit, contraction in credit supply, or both (Bernanke and Lown, 1991). The growth of bank credit depends on a set of factors that determine credit supply and on factors linked to the demand for credit (ECB, 2012). In their study of the so-called “capital crunch” in the US in 1990, Bernanke

and Lown (1991) demonstrate that both the reduced credit supply and stress demand effects played a major role in the recession of 1990.

It is widely known that banks play a key role in business activity through the credit channel. Financial crises are usually followed by a reduction in credit and GDP contraction. In this perspective, banks usually reduce the total supply of bank credit after loan losses (Kaminsky and Reinhart, 1999; Demirguc-Kunt et al., 2006). Under these circumstances, a “flight to quality” appears whereby banks respond by shifting their loan portfolio towards more creditworthy borrowers.

However, it is also normal for credit demand to fall during a recession, reflecting declines in aggregate demand. Therefore, a demand-side explanation of the fall in lending focuses on the generally weak state of borrowers’ balance sheets. This in turn leads firms to cut investment and working capital and, ultimately, demand for bank credit (Del’ Ariccia et al., 2008). Thus, potential borrowers who are more leveraged or possess collateral of lower quality will express lower demand for external finance.

Regardless of whether credit supply or credit demand is the constraining factor, the effects of credit rationing (a situation where credit demand exceeds credit supply), especially in times of financial crises, may be very serious (Borensztein and Lee, 2002). Although the effects on real economic activity are similar in both cases, the policy suggestions should be different. Therefore, it is important for policy guidance to distinguish whether the recent credit crunch arises from problems related to borrower creditworthiness or problems in the banking system.

## 2.2 Banking Concentration and Firm Performance

A highly concentrated banking sector may reflect lack of competition (Beck et al., 2003). Boyd and De Nicolo' (2005) argue that market power in banking allows banks to boost the interest rate they charge to firms. This in turn induces firms to assume greater risk. Their findings indicate a positive relationship between concentration and bank fragility and thus the probability of systemic distress. In the same way, Caminal and Matutes (2002) show that less competition can lead to less credit rationing, larger loans and higher probability of failure if loans are subject to multiplicative uncertainty. In general, the empirical evidence shows bank competition affects in a positive way firm performance. For example, Bonaccorsi and Del'Araccia (2004) and Cetorelli and Strahan (2004) find a significant and positive relationship between firm entry and bank competition. In the same line, Teruel and Segarra (2010) demonstrate that bank competition has a positive impact on firm growth with respect to change of sales and employees, but a negative one on productivity growth and value added growth.

However, some authors provide argumentations that a less concentrated banking sector with many banks is more prone to financial crises than a concentrated banking sector with a few banks (e.g. Allen and Gale, 2004). Along the same line, Beck et al. (2006) find that crises are less likely in economies with more concentrated banking systems.

### 2.3 Firm Growth – Financial Constraints

Modigliani and Miller (1958) suggest a theoretical background according to which, in perfect capital markets with symmetric information, the financial structure of a firm does not affect the decision for firm investment. By contrast, when

asymmetric information<sup>1</sup> and imperfections appear in capital markets, the aforementioned theorem fails to be in operation. This asymmetry occurs because borrowing firms exhibit superior information compared to external lenders thus leading to credit rationing (Stiglitz and Weiss, 1981). Consequently internal and external funds cannot be considered as perfect substitutes and thus the balance sheets of firms play a key role in their credibility (Myers and Majluf, 1984). As a result, a wedge exists between the costs of these financing sources since external funds are more costly than internal funds<sup>2</sup>.

Fazzari et al. (1988) make a significant theoretical contribution by revealing the existence of a monotonic relationship between financing constraints and investment-cash flow sensitivity. This is a result of the deviation between the costs of external and internal funds. In fact, the authors have focused their investigation on the relationship between cash flow and investment. Their findings support that liquidity constraints may play a crucial role on the decisions regarding firm's investment since the investment rate of a firm depends on its cash flow availability. Hence, higher investment-cash flow sensitivities imply greater financing constraints. On the contrary, Kaplan and Zingales (1997) criticize this theoretical view by demonstrating that firm investment decisions under profit maximizing behaviour do not suggest such a monotonic relationship. This is in agreement with the empirical evidence provided by Almeida et al. (2004) and Cleary (1999).

An important contribution in the examination of firm growth in the context of financing constraints was made by Carpenter and Petersen (2002), using the internal finance theory of growth in order to explain the role of financing constraints on firm growth. In particular, they employ a sample of small quoted US firms to estimate

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<sup>1</sup> According to Akerlof (1970) informational asymmetries can generate a "lemon" problem in capital markets.

<sup>2</sup> This cost differential is alternatively known as external finance premium.

growth-cash flow sensitivity. Their findings suggest that the growth-cash flow sensitivity of firms with better access to external funds is smaller than that of firms with greater financing constraints. In particular, firms that face considerable difficulties in accessing external funds are found to exhibit a monotonic relationship between growth and internal funds. This means that the higher growth-cash flow sensitivity of these firms reflects greater credit constraints.

Another alternative approach in dealing with the relationship between liquidity constraints and firm growth has been developed by Elston (2002). Using data for German Neuer-Markt firms, she controls for firm size and firm age and concludes that firm growth is positively related to cash flow. Based on Elston (2002) and applying OLS for balanced panel Italian data, Fagiolo and Luzzi (2006) also examine the impact of liquidity constraints on firm growth dynamics for surviving firms operating in the manufacturing sector during the period 1995-2000.

Musso and Schiavo (2008), in their recent paper on French manufacturing firms, propose that access to external funds has a positive influence on firm growth. Another recent study by Aghion et al. (2007) concludes that financial development in terms of access to external funds greatly improves the post-entry growth of new firms. According to Beck et al. (2005b), financial development allows firms to overcome obstacles impeding fast growth. Binks and Ennew (1996) find that firms with growth plans face tighter credit constraints than those without growth plans, but this might be offset by the kind of relationship held between the growing firms and their external lenders. Laeven and Valencia (2011), using cross-sectional data on 50 countries, examine the effects of banking recapitalization policies on firm growth during the recent financial crisis. Their findings suggest a positive sign on this nexus for more financially dependent firms.

Brito and Mello (1995) demonstrate how the premium cost of external finance in comparison to internal finance is produced by the uncertainty faced by lenders with regards to the quality of the borrowing firms' growth prospects. Over time, however, external lenders evaluate and learn the behaviour of borrowing firms and can thus adjust the terms of their loan contracts. As a result young firms with unknown growth prospects have difficulties accessing credit thus bringing about greater financing constraints. Beck et al. (2005a), using cross-sectional data for different countries and industries, explore the impact of financial factors on the shape of firm size distribution. The main finding of this study states that financial development induces a, mostly, positive effect on the growth of small firms.

### **3. Data and Methodology**

This study uses longitudinal panel data of firms operating in the 17 countries of the euro-area and Lithuania for the period 2005-2011. Firm-level data derived from the WorldScope Database (included in Datastream) which contains annual balance-sheets of quoted firms for several countries. A cleaning procedure was performed to isolate entering and exiting firms; thus the final sample consists of solely surviving firms over the examined period. In doing so, a sample selection bias may emerge (see Mansfield, 1962), however Audretsch et al. (2004) and Hall (1987) demonstrate that this problem is not evident in small periods of time. As regards country-level data, financial and banking structure indicators sourced from the World Bank (financial stability), ECB (banking concentration; loans from credit institutions to non-financial corporations), and, the International Country Risk Guide (indicators of political, economic and financial risk).



In addition, countries are classified into two groups based on the median of the banking concentration index as it recorded in the first year of the examined period: a) more banking concentrated countries (those whose banking concentration exceeds the median); b) less banking concentrated countries (those belonging to the bottom half of the index). The group of more banking concentrated countries includes Estonia, Belgium, Netherlands, Finland, Lithuania, Malta, Portugal, Slovenia and Greece. On the other hand, the group of the less banking concentrated countries includes Slovakia, Cyprus, France, Ireland, Austria, Spain, Luxembourg, Italy and Germany.

The firm-level variables used in this study include firm growth, leverage and liquidity. Firm growth, measured by the deviation of the natural logarithms of sales in two subsequent years, refers to the dependent variable. To convert sales into real values, the HICP deflator provided by Eurostat was used per country. Regarding the firm-specific independent variables used, firm leverage is measured by the ratio of total debt to total assets. Highly leveraged corporate firms are more vulnerable during recessions and their investment demand may decline substantially. The proxy used for liquidity is the current ratio which results from current assets to current liabilities. Usually a recession puts additionally pressures on firm liquidity.

Regarding the country-level independent variables, the basic variable in order to capture credit crunch during the recent financial crisis is measured by the growth rate of loans to non-financial sector (following Bernanke and Lown, 1991; Berger and Udell, 1994; Hancock and Wilcox, 1998). Banking concentration is measured by the market share of the 5 largest banks.

The present paper takes also into account the macroeconomic riskiness of countries in terms of the following three indicators. First, political risk is a composite variable that considers factors such as: government stability, socioeconomic stability,

investment profile, internal conflict, external conflict, corruption, military involvement in politics, religion involvement in politics, law and order, ethnic tensions, democratic accountability, and bureaucratic quality. Economic risk is composed of GDP per capita, real GDP growth, annual inflation rates, budget balance as a percentage of GDP, and current account balance as a percentage of GDP. Financial risk variable assesses the ability of a country to finance its official, commercial, and trade debt obligations. This variable is composed by foreign debt as a percentage of the country's GDP, foreign debt service as a percentage of exports of goods and services, current account as a percentage of exports of goods and services, net international liquidity as the months of import cover, and exchange rate stability (see Fotopoulos and Louri, 2011). The larger the value for each of the last three indices, the lower a country's relevant risk.

Table 1 provides some basic summary statistics of the variables used for the total sample before (2005-2008) and after (2009-2011) the recent financial crisis. As expected for our basic variables, firm growth becomes negative after the recent financial crisis and a credit crunch appears as well.

**Table 1: Summary statistics**

	Total sample (2005-2011)	Total sample Before crisis (2005-2008)	Total sample After crisis (2009-2011)
firm growth	0.027 (0.574)	0.068 (0.576)	-0.014 (0.570)
leverage	1.049 (13.876)	0.903 (8.515)	1.243 (18.779)
liquidity	179.972 (132.785)	184.452 (134.103)	174.001 (130.781)
growth of credit	0.039 (0.081)	0.081 (0.066)	-0.016 (0.063)
banking concentration	0.502 (0.195)	0.494 (0.208)	0.512 (0.177)
political risk	0.805 (0.054)	0.814 (0.047)	0.792 (0.060)
economic risk	0.380 (0.041)	0.401 (0.026)	0.351 (0.039)
financial risk	0.376 (0.028)	0.381 (0.023)	0.368 (0.033)

Notes: The table presents means of firm-specific and country-specific variables. Standard deviations are reported in parentheses.

Our sample consists of panel data so unobserved heterogeneity can be controlled (Baltagi, 1995). The standard methods of panel estimation are fixed effects or random effects. Fixed effects coefficients are calculated from differences within each firm over time. The random-effects estimates are more efficient, since they incorporate information across individual firms as well as across periods. According to Arellano and Bover (1990), panel data is useful for this type of research because it allows for firm heterogeneity and reduces collinearity among the variables. To verify the nature of the individual effects, Hausman's (1978) specifications test is used. Our

estimations indicates that it is appropriate to use the fixed effects model since the random effects model is inconsistent.

Following the growth model provided by Rajan and Zingales (1998), the present analysis examines firm growth --instead of industry growth-- as dependent variable and comprises two groups of firm-specific and country-specific independent variables. All independent variables are lagged one period to limit potential endogeneity issues. Hence, our basic growth equation under estimation takes the following form:

$$G_{i,t} = a + \beta_1 \cdot \Delta Cr_{j,t-1} + \beta_2 \cdot X_{i,t-1} + \beta_3 \cdot Z_{j,t-1} + u_i$$

Where  $G_{i,t}$  corresponds to the growth of firm  $i$  at time  $t$ ,  $\Delta Cr_{j,t-1}$  denotes the growth of credit in country  $j$  at time  $t-1$ , the  $X$  vector includes firm-specific variables such as leverage and liquidity, while the  $Z$  vector captures the other country-specific independent variables such as banking concentration, and country risks.

#### 4. Results

The main results of the empirical analysis are presented in Tables 2 and 3. Table 2 reports the regression estimates for our basic equation described in the methodology section. In this context two models are estimated, namely model 1 and model 2. The difference between these two models concerns the credit growth variable. Model 1 assesses the impact of credit growth on firm growth for the total examination period, while model 2 includes the interactions of this key variable with the crises dummies instead. In this way model 2 enables the assessment of the separate effects of credit growth *before* and *after* the recent financial crisis.

Overall, our results indicate that firm growth is heavily dependent on changes in bank lending, since the relevant coefficient in model 1 appears positive and statistically significant at 1% level. However, examining the evolution of this impact

before and after the crisis (model 2) reveals that this positive and monotonic relationship disappears after the credit crunch eruption. This rather unexpected result may imply that during the crisis period firms appear to considerably reduce credit demand being aware of the deterioration of their balance sheets, thus the unlikelihood to secure a bank loan.

Another noticeable finding refers to the strong negative relationship that is found between banking concentration and firm growth. This means the more intensive the banking competition the easier the firms' access to credit and the higher the growth potential. This result is in the same line with Bonaccorsi and Del'Araccia (2004) and Cetorelli and Strahan (2004) who provide evidence on significant positive effects of banking competition on firm performance. With respect to firm-level and macroeconomic factors examined, we find that liquidity and political risk have a significant effect on firm growth.

Motivated by the significant role that banking concentration is found to play for firm growth, Table 3 presents estimation results for countries with a high banking concentration degree as compared to countries with a lower banking concentration degree. Focusing on the credit supply change – firm growth nexus our findings reveal the existence of a statistically significant relationship for both country groups, although a greater sensitivity is observed for countries with higher banking concentration. In other words, firms operating in countries with more concentrated banking sectors appear to be more financially dependent on bank credit.

**Table 2: Panel fixed effects results for the total sample**Dependent variable: Firm growth  $t$ 

Independent Variables	Model 1	Model 2
Credit growth $t-1$	0.222*** (0.089)	
Credit growth $t-1$ *(Crisis)		0.040 (0.140)
Credit growth $t-1$ *(1-Crisis)		0.670*** (0.115)
Banking concentration $t-1$	-0.546*** (0.204)	-0.359* (0.206)
Leverage $t-1$	0.00007 (0.00054)	0.00006 (0.00054)
Liquidity $t-1$	0.0003*** (0.00008)	0.0002*** (0.00008)
Political risk $t-1$	-1.120*** (0.382)	-0.747** (0.382)
Economic risk $t-1$	0.224 (0.263)	-0.053 (0.251)
Financial risk $t-1$	1.017* (0.570)	0.054 (0.610)
Constant term	0.681** (0.346)	0.737** (0.344)

Notes: These results concern 2086 firms i.e. the total sample of our study. \* The null hypothesis that each coefficient is equal to zero is rejected at the 10% level of significance. \*\* The null hypothesis that each coefficient is equal to zero is rejected at the 5% level of significance. \*\*\* The null hypothesis that each coefficient is equal to zero is rejected at the 1% level of significance. Standard errors are reported in parentheses.

**Table 3: Panel fixed effects results for the examined groups**Dependent variable: Firm growth  $\Delta$ 

	More Banking Concentrated Countries		Less Banking Concentrated Countries	
Independent Variables	Model 1	Model 2	Model 1	Model 2
Credit growth $\Delta_{t-1}$	0.520** (0.213)		0.261** (0.106)	
Credit growth $\Delta_{t-1}$ *(Crisis)		0.293 (0.307)		0.180 (0.186)
Credit growth $\Delta_{t-1}$ *(1-Crisis)		0.866** (0.399)		0.284** (0.114)
Leverage $\Delta_{t-1}$	0.00006 (0.0009)	0.00004 (0.0009)	0.002 (0.001)	0.002 (0.001)
Liquidity $\Delta_{t-1}$	0.0002 (0.0002)	0.0002 (0.0002)	0.0003*** (0.00006)	0.0003*** (0.00006)
Political risk $\Delta_{t-1}$	0.986 (1.239)	1.079 (1.242)	-1.293*** (0.308)	-1.284*** (0.309)
Economic risk $\Delta_{t-1}$	0.354 (0.902)	0.018 (0.960)	-0.260 (0.241)	-0.240 (0.244)
Financial risk $\Delta_{t-1}$	-0.082 (1.815)	-0.834 (1.957)	0.746* (0.458)	0.715 (0.461)
Constant term	-0.996 (0.832)	-0.696 (0.882)	0.837*** (0.316)	0.832*** (0.316)

*Notes:* These results concern 599 firms operating in more banking concentrated countries and 1487 firms in less banking concentrated countries. \*The null hypothesis that each coefficient is equal to zero is rejected at the 10% level of significance. \*\*The null hypothesis that each coefficient is equal to zero is rejected at the 5% level of significance. \*\*\* The null hypothesis that each coefficient is equal to zero is rejected at the 1% level of significance. Standard errors are reported in parentheses.

## 5. Conclusions

The primary purpose of the present paper is to explore the impact of the recent credit crunch on firm growth, and what is the role of banking structure on this nexus, especially during the current financial crisis. In doing so, the relationship between firm growth and changes on banking loans is examined for 2 groups of European countries with respect to the degree of banking concentration. The panel fixed effects

method is applied to 2086 firms operating in the euro-area (17) and Lithuania during the time period 2005-2011. Our basic findings show that firm growth is heavily dependent on changes in bank credit. Nevertheless, this strong relationship disappears after the credit crunch eruption. This interesting result may be explained on the grounds of credit demand as the main cause for credit crunch. In addition, we found that banking concentration has a significant negative effect on firm growth. Hence, the more intensive the banking competition the easier the firms' access to credit and the higher the growth potential. Also, we provide empirical evidence that firms operating in countries with more concentrated banking sectors appear to be more financially dependent on bank credit than those operating in less banking concentrated countries.

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