Can Firms Grow Without Credit? Evidence from the Euro Area, 2005-2011: A Quantile Panel Analysis

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ABSTRACT

This paper explores the effects of bank credit on firm growth before and after the recent financial crisis, taking into account different structural characteristics of banking sectors and domestic economies. Panel quantile analysis is used on a sample of 2075 euro area firms in 2005-2011. The post-2008 credit crunch is found to seriously affect only small, slow-growth firms and especially those operating in concentrated and domestic-dominated banking systems, and in riskier and less financially developed economies. Large, high-growth firms seem to be able to find alternative financial sources and, thus, may act as carriers and facilitators of a credit-less recovery.

Keywords: Credit Crunch; Firm Growth; Credit-less recovery; Financial Crisis; Panel Quantile Regressions

JEL classification: L1; L25; E51

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1. Introduction

The recent financial crisis has been the most severe in decades and its cost has been high. In 2009 GDP contracted by about 3.5% in the OECD area and unemployment reached 8.4% (from 6.1% the year before). In the euro area GDP output declined by about 4.4% while unemployment reached 9.6% (OECD, 2012). The crisis had a strong negative impact on real economic performance. The weak economic recovery and the credit crunch continue to take their toll on firm performance in terms of entry, growth and survival. The bank credit crunch following the financial crisis may constitute the main constraining factor for real economic activity. The fragmentation of financial conditions in the euro area poses a crucial obstacle to growth potential especially for SME's, as they are heavily dependent on bank credit (ECB, 2013). As the IMF (2013) reports even though interest rates post-2009 dropped sharply across most major economies, the amount of bank credit to firms decreased to a great extent.

The investigation of firm growth is significant for different reasons. First of all, the relevant literature has emphasized the contribution of growing firms to job creation (Wagner, 1992). Positive firm growth rate implies the creation of new jobs, while negative growth leads to job destruction.

A reference study in this discussion is undertaken by Birch (1979) who finds that new business formation and the growth of particularly small businesses constitute the main processes of job generation in the US-economy.

The main objective of this paper is to explore the effects of the credit crunch on firm growth during the recent financial crisis. Firm growth seems to have been severely affected with negative repercussions for output and employment in most European countries. Even though there is some published research on the effects of a credit crunch on real economic activity, only a limited number of studies have examined these issues in periods of financial crises (Laeven & Valencia, 2011; OECD, 2012; ECB, 2012). In this context, the present paper contributes to the literature by investigating the linkages between firm growth and the credit crunch in the euro area before and after 2008, taking into account structural characteristics of the banking sector and the domestic economy along different firm groups.

Additionally, to the best of our knowledge, this paper is a first attempt to apply panel quantile regressions in order to explore these issues. Estimating quantile regression models makes it possible to account for heterogeneity and non-Gaussian distributions, which are common when dealing with firm growth data. One of the great advantages is that the quantile regression estimators are robust to outliers and skewed distributions. A further powerful characteristic of this method is that it facilitates the estimation of slope effects at various percentage points (quantiles) of the relevant distribution (e.g. the credit crunch effect on firm growth in our case). Finally, allowing for unobserved heterogeneity,

this technique enables the exploration of differences in the growth rates among slow, moderate and fast-growing firms.

The paper is structured as follows: section I reviews the relevant literature; section II describes the data and the sample used; section III discusses methodological issues; section IV presents the main results of the empirical analysis; and section V summarizes the main conclusions.

2. Past evidence and theoretical underpinnings

2.1 Credit Crunches and Credit-less Recoveries

It is by now well accepted that there is a strong link between bank credit and business activity in terms of investment. However, in severe financial crises like the recent one that hit the euro area, banks significantly reduce the total supply of bank credit after loan losses (Kaminsky and Reinhart, 1999; Demirguc-Kunt et al., 2006). In other words, a credit crunch appears when there is a significant negative change in loan supply between two time periods (Berger and Udell, 1994), implying a leftward shift in the supply curve for bank loans (Bernanke and Lown, 1991).

Despite the fact that credit to the private sector matters considerably for a country to recover from a crisis, recent studies provide empirical evidence supporting that reductions in bank credit to firms do not necessarily hinder the economic recovery after a deep and prolonged recession (Takáts and Upper, 2013; Sugawara and Zalduendo, 2013; Bijsterbosch and Dahlhaus, 2011; Abiad et al., 2011). The European Commission (2013) recognizes that the ongoing (albeit slow) recovery in

the euro area could be explained on the grounds of such a credit-less recovery. In particular, the seminal study by Calvo et al. (2006) identifies the phenomenon of credit-less recoveries by focusing on how GDP, credit, and investment evolve following systemic sudden stops of capital flows. A key finding suggests that output regains fast its pre-crisis level, without a raise in bank credit (the so-called “Phoenix miracles”).

Kannan (2012) examines recessions and recoveries after banking crises in advanced economies and demonstrates that industries more heavily dependent on bank credit do not perform so well during following recoveries. Similarly, at the firm level, tighter credit constraints may lead credit-dependent firms to delay, curtail, or cancel their investment decisions. On the banks’ side, a “flight to quality” is taking place according to which banks respond by shifting their loan portfolio towards more creditworthy borrowers (Bernanke et al., 1996). In this case high-quality firms, capable of receiving credit, may drive output expansion, which occurs even in the absence of growth in aggregate credit.

By contrast, when the credit crunch affects the majority of firms irrespective of their quality, high-quality firms (e.g. high-growth firms, innovative firms) may be urged to seek for alternative sources of funds, such as retained earnings or capital from bond and equity markets, financial engineering tools, venture capital funds, business-angel schemes etc. Hence, the credit crunch may reveal industries and firms that are less dependent on bank credit as key players in economic restructuring and credit-less recoveries.

2.2 Foreign Bank Presence

There may be other factors at play that influence firm growth during a credit crunch apart from loan supply from domestic sources. The presence of foreign banks, the degree of financial development and the concentration in the banking industry may be included. With respect to firms' financing, a recent growing literature highlights the role of cross-border banking in the provision of funds, drawing special attention to the presence of foreign banks. In many countries, foreign banks have become important sources of financial intermediation, providing greater financial stability and growth (see Clarke et al., 2003; Claessens, 2006). Giannetti and Ongena (2009) present empirical results according to which foreign bank credit has a significant and positive impact on firm growth (measured either by sales or total assets).

However, there are concerns that, in an environment of financial fragility, the main channel through which contagion can arise is via cross-border banking linkages, since the foreign banking presence exposes the domestic financial system to shocks from abroad. Additionally, domestic banks may encounter losses on their foreign operations, which may then have negative implications for their domestic lending (Puri et al., 2011). Moreover, following a negative effect that reduces the attractiveness of investment in the domestic economy, foreign banks may decide to "cut and run", exacerbating the problems (Clarke et al., 2003). However, the presence of foreign banks may also be a stabilizing force once a crisis occurs, because they tend to have access to a more diversified (international) pool of liquidity than domestic banks (e.g. Peek and Rosengren, 2000; Claessens and van Horen, 2012).

2.3 Banking Concentration and Firm Performance

A highly concentrated banking sector may reflect strong market power and consequently higher bank profitability (Beck et al., 2003). Boyd and De Nicolo (2005) argue that market power in banking allows banks to raise 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. Along the same lines, Caminal and Matutes (2002) show that more market power in the banking industry can lead to less credit rationing, larger loans and a higher probability of failure if loans are subject to multiplicative uncertainty. Hannan (1991) provides evidence that interest rates for small commercial loans tend to be higher in more concentrated banking industries.

In general, the majority of empirical evidence tends to show that banking concentration affects firm performance in a negative way. For example, Black and Strahan (2002), Bonaccorsi di Patti and Del'Ariccia (2004) and Cetorelli and Strahan (2006) find a significant and negative relationship between firm entry and banking concentration. In the same vein, Teruel and Segarra (2010) demonstrate that banking concentration has a negative impact on firm growth as measured by changes in sales and employment, but a positive one on productivity growth and growth of value added.

However, some authors argue that a less concentrated banking system with many banks is more prone to financial crises than a concentrated banking sector with fewer but stronger 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.

2.4 Firm Growth and Financial Constraints

Modigliani and Miller (1958) develop a theoretical structure according to which, given perfect capital markets and symmetric information, the financial structure of a firm does not affect the firm's investment decision. By contrast, if capital markets and financial institutions are characterized by asymmetric information and imperfections, their theorem no longer holds. Asymmetries can occur because borrowing firms have 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 potential financing sources with external funds being more costly than internal funds[1]. Thus, firms are often constrained to raise the desirable funds to implement their investment projects and growth objectives. Information asymmetries may also lead to suboptimal allocation of credit to firms since, for example, lenders may choose to finance projects with unobservable higher risk.

Financial development is widely recognized as a key contributor to economic performance (e.g. King and Levine, 1993). At the level of the individual firm, financial development can positively affect business performance by decreasing information asymmetries and hence

[1] This cost differential is alternatively known as external finance premium, causing the inefficiency to generate a "financing hierarchy".

reducing the cost of external capital. As a result, it has been claimed that firms operating in countries with a lower degree of financial development will face greater financial constraints. In the same vein, Rajan and Zingales (1998) demonstrate that financial development reduces the wedge between external and internal finance and enhances growth, especially for firms that are mostly dependent on external funds. Thus, higher financial development implies lower financing constraints for firms (Levine, 2005; Love, 2003) encouraging in this way firm growth (Bena and Jurajda, 2011; Demirgüç-Kunt and Maksimovic, 1998).

The extensive overview provided by Beck and Demirgüç-Kunt (2006) summarizes recent empirical evidence which shows that access to finance constitutes a crucial obstacle to the growth of SME's. Also, the existence of well-developed financial systems helps firms to find external finance, alleviating their growth constraints. However, innovative financial mechanisms and tools may help relax external financial constraints, even in the absence of well-developed financial markets and institutions. 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. (2006), financial development allows firms to overcome obstacles impeding fast growth.

3. Methodological Issues

The goal of the present analysis is to estimate empirically the effect of the credit crunch on firm growth using a panel of firm-level data for the 17 euro area countries over a span of 7 years (2005-2011). The empirical model we suggest is an extension of the growth model developed by Rajan and Zingales (1998) as adjusted at the firm level by Laeven and Valencia (2011). Hence, we consider the following classical linear regression model for panel data:

$$G_{ij,t} = a_{ij} + \beta_1 \Delta Cr_{j,t} + \beta_2 X_{i,t-1} + \beta_3 Z_{j,t} + u_{ij,t} \qquad (1)$$

where the dependent variable, $G_{ij,t}$ measures the growth of firm i, in country j, at time t. The term $\Delta Cr_{j,t}$ denotes the growth of credit in country j at time t. The vector X includes firm-specific variables, namely initial firm size, leverage and liquidity. The vector Z captures other country-specific independent variables such as the degree of banking concentration, financial stability, and macroeconomic risk. The explanatory variables in vector X are lagged one period to limit potential endogeneity issues. An exogenous shock in the error term may lead to a change in the growth rate in a specific time period, which may lead to a contemporaneous change in one of the independent variables. Given that these variables do not vary much overtime, one period lag can be seen as a good instrument. Parameters *α* and *β* denote the fixed effects and the slope coefficients respectively.

Estimation of (1) using panel data techniques requires specific assumptions about the distribution of the error term *u*. In particular, the

standard OLS fixed effects methodology requires that $u_{ij,t}$ are independently and identically distributed (iid) and in addition, for the parameters β to have all the desired properties, a normal distribution is assumed (Gaussian errors).

However, the above assumptions of Gaussian errors may not hold in cases the dependent variable exhibits highly skewed and heavy-tailed distribution. In our case, it is very likely that departures from normality are observed in the firm level dataset of growth rates, given the heterogeneity characterizing firms in our sample. The stylized facts presented in the next section provide such evidence. Some firms may grow faster than others for reasons that are not captured by the model and are of an idiosyncratic nature. Least squares estimation techniques give estimates that represent the effect from an independent variable on the 'average firm'. Therefore, such estimates are not representative of the entire distribution and give an incomplete picture of the impact exercised by the variables of interest.

One approach to deal with non-Gaussian distributions in linear regression models is to use quantile regression techniques introduced by Koenker and Bassett (1978). One of the great advantages of this approach is that the quantile regression estimators are robust to outliers and heavy-tailed distributions (Buchinsky, 1994; 1998). Another important feature is that it enables the estimation of the slope effects (e.g. the credit crunch effect on firm growth in our case) at various percentage points (quantiles), which describe the entire conditional distribution of the dependent variable, and not only the mean. Finally, by relaxing the assumption of iid errors at all points of the conditional

distribution, thus allowing for unobserved heterogeneity, the model becomes more interesting in explaining differences in the growth patterns among firms.

Given the abovementioned benefits of quantile estimations, some empirical works in industrial economics have employed a quantile analysis, but almost all of them are based on large cross-sectional data (e.g. Dimelis and Louri, 2002; Coad and Rao, 2008). To the best of our knowledge, this is a first attempt to the relevant literature using a panel quantile econometric analysis.

To estimate model (1) using quantile regressions for a panel of firm level data we follow the approach proposed by Koenker (2004). This approach derives from the idea of penalized least squares interpretation of the classical random effects estimator and is appropriate for samples with a large number of cross sections and a relatively small number of time observations. Since our sample satisfies these conditions (see next section), we proceed with a short description of the model to be estimated.

The panel linear regression model (1) is written in matrix notation and quantile regression form:

$$y_{it} = a_i + x'_{it}\beta(q) + u_{it}, \quad t = 1, \dots, m_i \ , \ i = 1, \dots, n \qquad (2)$$

where the data were pooled for all countries so that y_{it} is the growth rate of firm i at time t. The vector $x'_{it} = [\Delta Cr_t \ \mathrm{X}_{i,t-1} \ \mathrm{Z}_t]$ contains all the explanatory variables in (1). The letter q denotes the quantile (0 < q < 1)

of the conditional distribution. The effects of the x's are allowed to depend upon the quantile q, but the fixed effects a_i do not.

Following Koenker (2004), the estimation of (2) for several quantiles simultaneously is obtained by solving the minimization problem[2]

$$min_{(\alpha\beta)} \sum_{k=1}^{\tau} \sum_{j=1}^{n} \sum_{i=1}^{m_i} w_k \rho_{q_k} \left(y_{ij} - a_i - x_{ij}' \beta(q_k) \right) \qquad (3)$$

where $\rho_{q_k} = u(q - I(u < 0))$ denotes the piecewise linear quantile loss function of Koenker and Bassett (1978). The weights w_k control the relative influence of the τ quantiles $(q_1, \cdots, q_\tau)$ on the estimation of the a_i parameters.

When the number of cross sections n is large relative to the time dimension m, then we have a large number of fixed effects which can significantly inflate the variability of the other coefficient estimates. Koenker (2004) suggested a regularization or shrinkage of these individual effects toward a common value by considering a penalty. This method, called penalized quantile regression, takes the following form:

$$min_{(\alpha\beta)} \sum_{k=1}^{\tau} \sum_{j=1}^{n} \sum_{i=1}^{m_i} w_k \rho_{q_k} \left(y_{ij} - a_i - x_{ij}' \beta(q_k) \right) + \lambda P(a) \qquad (4)$$

where $P(a) = \sum_{i=1}^{n} |a_i|$ is the penalty considered. More details on the solution method can be found in the seminal paper of Koenker (2004).

[2] The problem was solved using the algorithms of "R" econometric software since the relevant command package "rqpd" is available for the purposes of the specific analysis.

4. Data and Descriptive Statistics

This study uses longitudinal panel data of firms operating in the 17 countries of the euro area for the period 2005-2011.[3] Thus, the study period covers 7 years and it has been divided into 2 sub-periods, before and after the start of crisis, by using a dummy. Firm-level data were retrieved from the WorldScope Database (included in Datastream) which contains annual balance-sheets of quoted firms for many countries. As regards the country-level data, financial and banking structure indicators are sourced from the World Bank (financial stability, foreign bank penetration), the ECB (banking concentration; loans from credit institutions to non-financial corporations) and the International Country Risk Guide (a composite indicator of macroeconomic risk).

Countries are classified into two groups based on the median of the foreign bank-penetration index[4]: a) more foreign bank-dominated countries (above the median); b) less foreign bank-dominated countries (below the median). The group of foreign bank-dominated countries includes Austria, Belgium, Cyprus, Estonia, Finland, Ireland, Luxembourg, Slovakia and Slovenia. On the other hand, the group of the domestic bank-dominated countries includes France, Germany, Greece, Italy, Malta, Netherlands, Portugal and Spain.

[3] The paper was written in the beginning of 2014 while data selection took place in early 2013. At that time some firm-level financial data were only available up to 2011.

[4] The values of foreign bank penetration for each examined country are derived from the study of Claessens and Van Horen (2012) which provides World Bank with the relevant data. The available data for this variable reach up to 2009. For each country the average for the period 2005-2009 is computed and countries are classified into more and less foreign bank-dominated based on the corresponding median.

The firm-level variables used in this study include firm growth, firm size, leverage and liquidity. More particularly, firm size is measured by sales and scaled by the natural logarithm.[5] The dependent variable, firm growth, is measured by the difference of the natural logarithms of sales in two subsequent years To convert sales into real values, country-specific HICP deflators provided by Eurostat were used.

Regarding the firm-specific financial variables, 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 for liquidity is the current ratio (the ratio of current assets to current liabilities). Usually, a recession or other crises put additional pressures on firm liquidity. As a result, large firms may prefer to hold their available liquidity rather than investing, in order to be more robust to the increased risks of their customers and consistent with their obligations to suppliers.

Regarding the country-level independent variables, the basic variable capturing the recent credit crunch is measured by the growth rate of new loans to the non-financial sector (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. Financial stability is approximated by the z-score at country-level derived from the Global

[5] Common measures of firm size involve number of employees, sales and total assets. In line with relevant literature (see for example Audretsch et al., 2004), we opted for sales as the most appropriate measure of firm size for datasets that include both manufacturing and service sectors. In this respect, 'total assets' variable is considered inappropriate for measuring firm size in the case of services, since it tends to undervalue the significance of intangible assets in business activities of the services sector.

Financial Development Database.[6] More specifically, the z-score is measured by the ratio (return on assets+equity/assets)/standard deviation of return on assets. The higher the z-score, the lower the probability of insolvency, i.e. the probability that the value of the firm's assets falls below that of its debt.

The present paper also takes into account the macroeconomic risks in different countries, by including a composite index consisting of political, economic and financial factors.[7] The larger the value for each of the last three indices, the lower a country's relevant risk. To facilitate the interpretation of our findings, we calculated the inverse index of the composite variable. Thus, the greater the value of the edited composite index, the higher the risk of a country.

Table 1 provides some basic summary statistics of the variables used for the total period and for the sub-periods before (2005-2008) and after (2009-2011) the beginning of the recent financial crisis. As expected for our basic variables, after the recent financial crisis firm growth turns negative and a credit crunch is observed. Table 2 reports the number of quoted firms per country after the cleaning process[8].

[6] The Global Financial Development Database is an extensive dataset of financial system indicators for 203 countries, containing annual data until 2011. Čihák et al. (2012) provide an extensive description of the database.

[7] Political risk is a variable that considers jointly 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 assesses the ability of a country to finance its official, commercial, and trade debt obligations. This index considers 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).

[8] Our analysis focuses on quoted firms for which data on firm growth and financial variables such as liquidity and leverage were available. Moreover, we consider firms that participated exclusively in the stock market of the country that they are located.

Table 1: Summary statistics

	Total Period (2005-2011)	Pre-Crisis Period (2005-2008)	Post-Crisis Period (2009-2011)
Firm Growth	0.0270	0.0678	-0.0138
	(0.5764)	(0.5778)	(0.5720)
Credit Change (%)	0.0388	0.0799	-0.0159
	(0.0797)	(0.0650)	(0.0628)
Leverage	1.0545	0.9076	1.2504
	(13.9244)	(8.5455)	(18.8451)
Liquidity	1.8538	1.8966	1.7967
	(4.9766)	(4.8512)	(5.1389)
Firm Size	11.9946	11.9972	11.9912
	(2.5073)	(2.4545)	(2.5763)
Banking	0.5000	0.4920	0.5106
Concentration	(0.1948)	(0.2071)	(0.1764)
Country Risk	0.2188	0.2006	0.2430
	(0.0547)	(0.0428)	(0.0592)
Financial Stability	12.4643	12.6760	12.1819
	(7.2096)	(7.4153)	(6.9164)

Notes: The table presents means of firm-specific and country-specific variables, with standard deviations reported in parentheses.

Table 2: Number of Quoted Firms per Country

Country	**Number of quoted firms**
Austria	52
Belgium	86
Finland	116
France	483
Germany	436
Luxembourg	8
Malta	9
Netherlands	79
Estonia	11
Slovakia	8
Italy	201
Spain	203
Greece	222
Cyprus	62
Portugal	45
Slovenia	18
Ireland	36
Eurozone	**2075**

Table 3 describes in more detail additional descriptive statistics for the basic variables, examined in this study. In particular, the percentiles for firm growth, i.e. the dependent variable of our model, and credit change are presented in Table 2. The skewness and kyrtosis of these variables are reported as well.

Table 3: Growth Percentiles

	Total Period (2005-2011)	Pre-Crisis Period (2005-2008)	Post-Crisis Period (2009-2011)
Firm Growth Skewness	-0.8335	-1.2369	-0.4332
Firm Growth Kyrtosis	40.7937	42.2776	40.2570
Firm growth (1%)	-2.1373	-2.3639	-1.8307
Firm growth (5%)	-0.4745	-0.3556	-0.5323
Firm growth (10%)	-0.2419	-0.1396	-0.3073
Firm growth (25%)	-0.0666	-0.0223	-0.1149
Firm growth (50%)	0.0318	0.0594	0.0006
Firm growth (75%)	0.1391	0.1751	0.1049
Firm growth (90%)	0.3147	0.3789	0.2498
Firm growth (95%)	0.5109	0.5915	0.4100
Firm growth (99%)	1.8406	1.6151	2.0479
Credit Change Skewness	0.2389	1.2311	-0.5799
Credit Change Kyrtosis	6.7587	6.0916	15.7839
Credit Change (1%)	-0.1014	-0.0355	-0.1014
Credit Change (5%)	-0.0898	-0.0355	-0.1004
Credit Change (10%)	-0.0512	0.0154	-0.0898
Credit Change (25%)	-0.0199	0.0457	-0.0432
Credit Change (50%)	0.0316	0.0695	-0.0199
Credit Change (75%)	0.0735	0.1153	0.0041
Credit Change (90%)	0.1305	0.1489	0.0248
Credit Change (95%)	0.1908	0.2162	0.0616
Credit Change (99%)	0.2648	0.2753	0.1908

Figure 1 shows the distribution of the dependent variable (i.e. deflated annual firm growth), for the average of the period examined. In doing so, we used a kernel smoothing density estimation. The use of a kernel density smoother allows for each point of the estimated probability

density function to be considered as a weighted sum of the data frequencies in the neighborhood around the estimated point.[9]

Figure 1: Firm growth distribution for the average of period

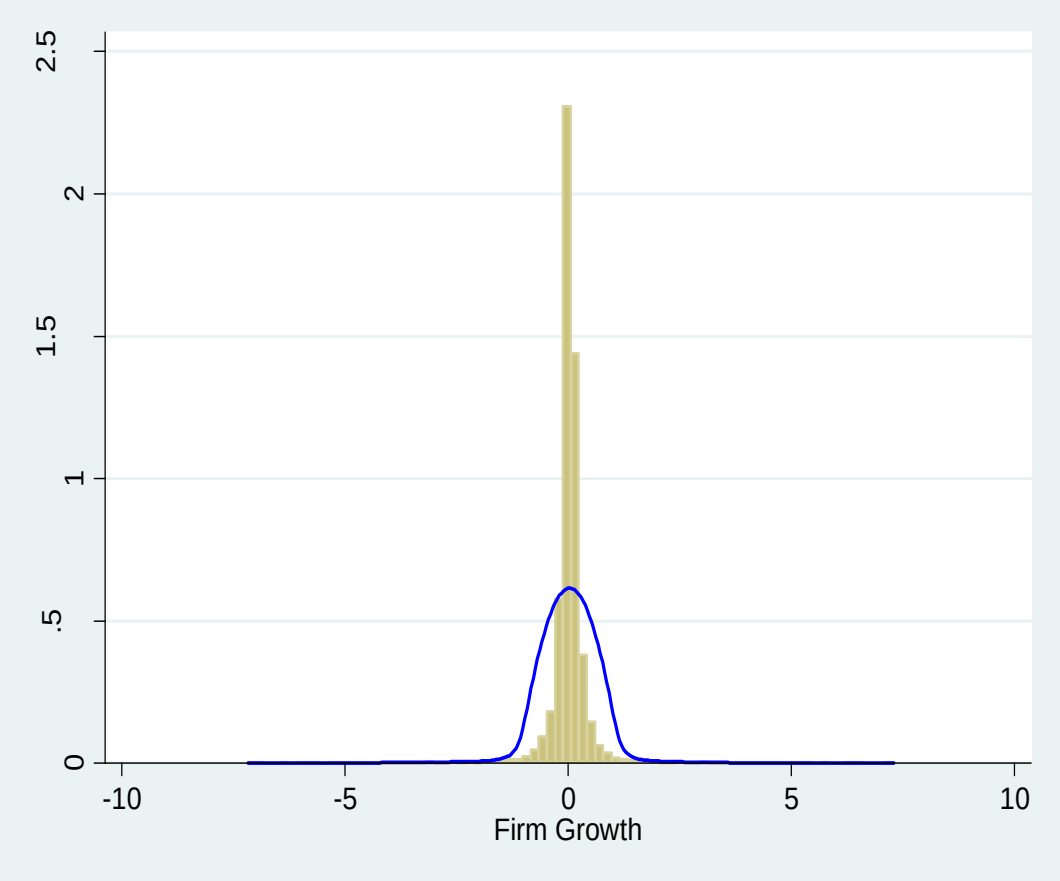
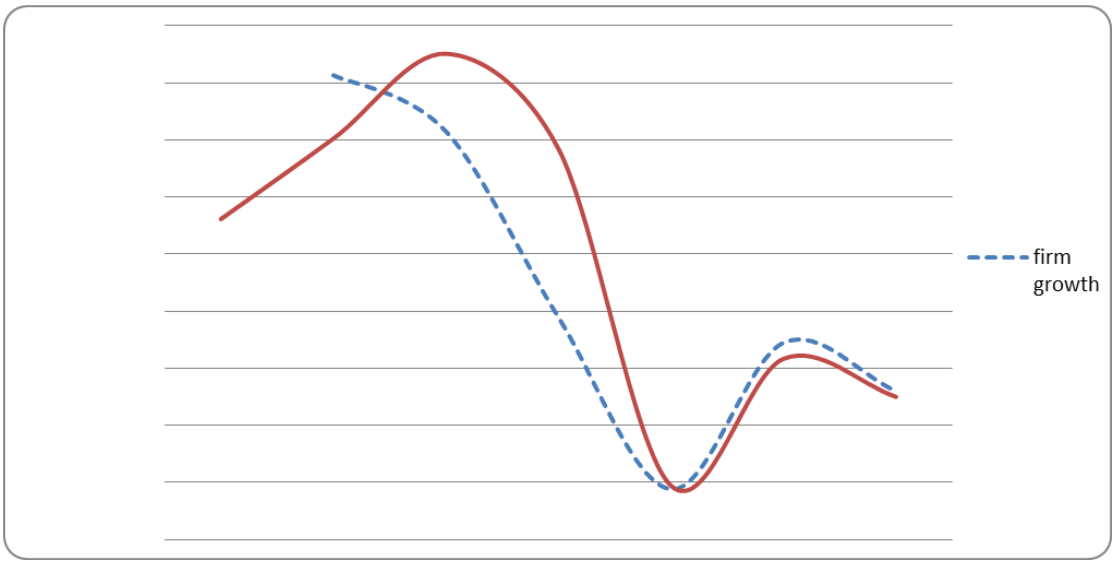


Figure 2 presents the evolution of firm growth and the change in credit in the whole period under examination. It is clear that firm growth becomes negative and the credit crunch appears after the beginning of the financial crisis in the euro area.

[9] The density presented in Figure 1 is estimated using the bandwidth of 0.5. The bandwidth parameter (i.e. the width of the neighborhood at each point) determines the degree of smoothing in the density under estimation (Silverman, 1986). Estimation with different bandwidths does not yield qualitatively different results.

Figure 2: Total sample



5. Results

The main results of the empirical analysis are presented in Tables 4, 5 and 6. Table 4 reports the estimates for our basic equation described in the methodology section for the total sample per each quantile (i.e. low-growth; medium-growth; and high-growth firms). Tables 5 and 6 present the results of the separate estimates for the 2 country groups, that is the more and the less foreign bank-dominated countries, respectively. The first two rows of all tables present the results of the interaction terms for the change in credit with the "crisis" dummy and "1-crisis" dummy respectively[10], so that we have estimates of the impact of credit change on firm growth post and pre crisis. In this way, the model examined enables an assessment of the separate effects of credit growth *before* and *after* the start of the recent financial crisis.

[10] The crisis dummy takes the value 0 for the sub-period (2005-2008) and 1 for the sub-period (2009-2011), while the inverse correspondence holds for the (1-crisis) dummy.

Table 4: Firm Growth in euro area, total sample, 2005-2011

	Panel Quantile Regressions				
	10%	25%	50%	75%	90%
Credit %Change*(post-crisis)	0.6888*** (0.1928)	0.2442*** (0.0663)	0.0693 (0.0696)	-0.0043 (0.0566)	-0.2208 (0.1843)
Credit %Change*(pre-crisis)	0.7914*** (0.0686)	0.5072*** (0.0291)	0.3586*** (0.0301)	0.4521*** (0.0573)	0.8184*** (0.1240)
Size	0.0239*** (0.0023)	0.0069*** (0.0009)	-0.0010 (0.0009)	-0.0127*** (0.0014)	-0.0337*** (0.0034)
Liquidity	-0.0079 (0.0065)	-0.0039*** (0.0013)	0.0001 (0.0030)	0.0020 (0.0059)	0.0242 (0.0177)
Leverage	-0.0168** (0.0088)	-0.0002 (0.0029)	-0.0003 (0.0002)	0.0000 (0.0002)	0.0000 (0.0103)
CR5	-0.1769*** (0.0412)	-0.0643*** (0.0111)	-0.0453*** (0.0115)	-0.0440** (0.0188)	0.0257 (0.0515)
Risk	-0.5588*** (0.1217)	-0.3619*** (0.0494)	-0.3389*** (0.0477)	-0.4204*** (0.0651)	-0.2384 (0.1516)
Z-score	0.0041*** (0.0008)	0.0020*** (0.0003)	0.0014*** (0.0003)	0.0013*** (0.0005)	0.0016 (0.0013)
Constant term	-0.3770*** (0.0449)	-0.08986*** (0.0194)	0.0963*** (0.0193)	0.3559*** (0.0313)	0.6568*** (0.0828)

Notes: These results concern 2075 firms i.e. the total sample of our study (number of observations: 14525).* 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. Also, a test is performed confirming that there are statistical significant differences of the credit change coefficients between pre and post crises periods for the 50%, 75%, 90% quantiles.

Overall, our pre-crisis results indicate that firm growth is heavily dependent on changes in bank lending, since the relevant coefficient in Table 4 appears positive and statistically significant at 1% level. However, examining the evolution of this impact after the crisis outbreak, i.e. when a credit crunch occurs, reveals that this positive and monotonic relationship holds only in lower quantiles. It does not appear that the credit crunch affected fast-growth firms. In other words, this

empirical evidence may suggest that the occurrence of the credit crunch lowers mainly the growth rates of slow-growth firms.

These interesting findings may imply that fast-growth firms have access to innovative financial sources --such as European structural funds (e.g. Risk Sharing Finance Facility provided by the European Investment Bank); greater access to financial stock and bond markets; new financial engineering tools; venture capital; business angels; crowd-funding etc-- during the crisis period. Also, fast-growing firms may generate more internal finance and hence may be less dependent on external financial sources. Hence, it can be argued that high-growth firms may constitute the carriers and facilitators of credit-less recovery in the euro area following the recent financial crisis.

The results do not change significantly when we employ separate regressions for small firms. However, firm growth of medium-sized and large firms seems not to be affected by the credit crunch. These estimates for the size groups[11] of firms are provided in the Appendix I (Tables 7-10).

Furthermore, our results reveal that initial firm size has a strong positive effect on firm growth in lower quantiles, whereas it has a negative effect in upper quantiles. In the context of Gibrat's Law[12], this means that it is rejected albeit in a different way (sign) across quantiles. With respect to

[11] The firms were classified into four size classes based on their sales in the first year of the examined period and following the most recent definitions of the European Commission (2003). In particular, large firms are defined as those whose sales are more than €50 million, medium-sized firms' turnover value lies between €10 million and €50 million, and small firms' sales vary between €2 million and €10 million. Micro firms include those whose turnover value is less than €2 million.

12 In its simplest form, Gibrat's Law assumes the existence of independence between firm growth and initial firm size.

the other firm-level factors examined, we find no significant impact from firm leverage and liquidity in most cases.

As regards the other macroeconomic variables, we find that risk exhibits a significant negative impact, as expected, for all but firms in the top 10%. Another noticeable finding refers to the strong negative relationship that is found between banking concentration and firm growth. This means the lower market power in banking industries the easier the firms' access to credit and the higher the growth potential. This result is in the same line with Bonaccorsi and Del'Ariccia (2004) and Cetorelli and Strahan (2006) who provide evidence on significant negative effects of banking concentration on firm performance. Looking at the financial stability variable (z-score), we find that its effect on firm growth is positive and significant. Hence, the higher the degree of insolvency in a country, the lower is firm growth.

Looking at the upper quantile (90%) – superfast-growth firms – we notice that most variables (apart from pre-crisis credit change and firm size) are insignificant, which means that structural driving forces such as innovative characteristics may push firm growth in the 90% quantile.

Table 5 and Table 6 present estimation results for countries with a high foreign bank- penetration degree as compared to countries with a lower foreign bank-penetration degree, respectively. Focusing on the credit supply change - firm growth nexus after the start of crisis, our findings reveal that the credit crunch does not affect firm growth in foreign bank-dominated countries. However, our results show the existence of a statistically significant relationship in domestic bank-dominated countries, especially for lower and medium quantiles (10%, 25%, 50%

quantiles). These findings can be explained by the fact that foreign banks may work as a stabilizing force once a crisis occurs because they tend to have access to a more diversified (international) pool of liquidity than do domestic banks (e.g. Peek and Rosengren, 2000; Claessens and van Horen, 2012). Further support of this result is provided on the grounds of the global advantage hypothesis provided by Berger et al. (2000). According to this theoretical argument foreign banks may be more cost efficient in their cross-border activities as they are able to spread their superior managerial skills and procedures over more resources. Also the authors state that foreign banks "*may also raise revenues through superior investment or risk management skills by providing superior quality or variety of services that some customers prefer or by obtaining diversification of risks that allows them to undertake investments with higher risk and higher expected returns*".

Furthermore, we can observe that macro variables (risk and z-score) are less important in foreign bank-dominated countries compared to domestic bank-dominated countries. Thus, foreign banks seem to be an important source of financial intermediation and may contribute to retaining the coherence of the financial system.

Table 5: Firm Growth in euro area countries with higher foreign bank penetration, 2005-2011

	Panel Quantile Regressions				
	10%	25%	50%	75%	90%
Credit % Change*(post-crisis)	0.4826	0.3336	-0.0581	0.0976	-0.7074
	(0.4202)	(0.2138)	(0.0976)	(0.1145)	(0.5113)
Credit % Change*(pre-crisis)	0.5615***	0.4217***	0.3302***	0.3805***	0.6423***
	(0.2193)	(0.0740)	(0.0472)	(0.0886)	(0.2259)
Size	0.0304***	0.0061	0.0024	-0.0025	-0.0333*
	(0.0101)	(0.0044)	(0.0024)	(0.0046)	(0.0117)
Liquidity	-0.0235	-0.0119	-0.0003	0.0189	0.0575**
	(0.0207)	(0.0116)	(0.0063)	(0.0172)	(0.0256)
Leverage	-0.0226	-0.0036	0.0004	0.0001	0.0256
	(0.0173)	(0.0079)	(0.0013)	(0.0010)	(0.0179)
CR5	-0.1687	0.0233	0.0420	-0.0142	-0.0915
	(0.1324)	(0.0422)	(0.0308)	(0.0529)	(0.1632)
Risk	-0.2389	-0.0892	-0.0461	-0.3369*	-1.4091***
	(0.5028)	(0.2181)	(0.1151)	(0.1820)	(0.4596)
Z-score	-0.0028	0.0009	0.0006	0.0002	0.0014
	(0.0022)	(0.0009)	(0.0006)	(0.0010)	(0.0034)
Constant term	-0.4174**	-0.1644	-0.0554	0.1787*	0.9152***
	(0.2146)	(0.1059)	(0.0485)	(0.0976)	(0.2248)

Notes: These results concern 397 firms i.e. operating in more foreign banking penetrated countries (number of observations: 2779). * 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. Also, a test is performed confirming that there are statistical significant differences of the credit change coefficients between pre and post crises periods for all quantiles.

Table 6: Firm Growth in euro area countries with lower foreign bank penetration, 2005-2011

	Panel Quantile Regressions				
	10%	25%	50%	75%	90%
Credit % Change*(post-crisis)	0.9137***	0.2469**	0.1678**	0.1199	-0.1088
	(0.2339)	(0.0985)	(0.0738)	(0.1057)	(0.2911)
Credit % Change*(pre-crisis)	0.4931***	0.4435***	0.3653***	0.4722***	0.8811***
	(0.0660)	(0.0534)	(0.0348)	(0.0628)	(0.1247)
Size	0.0177***	0.0041***	-	-	-
	(0.0026)	(0.0012)	0.0032***	0.0142***	0.0349***
			(0.0010)	(0.0015)	(0.0033)
Liquidity	-0.0054	-0.0042***	0.0003	0.0020	0.0122
	(0.0061)	(0.0014)	(0.0034)	(0.0053)	(0.0126)
Leverage	0.0002	-0.0001	-0.0001	0.0000	-0.0005
	(0.0054)	(0.0002)	(0.0002)	(0.0005)	(0.0105)
CR5	-0.0066	0.0141	-0.0010	-0.0035	-0.0034
	(0.0440)	(0.0187)	(0.0175)	(0.0250)	(0.0607)
Risk	-	-0.7021***	-	-	-0.1175
	1.59069***	(0.0901)	0.5294***	0.5020***	(0.1832)
	(0.2075)		(0.0632)	(0.0728)	
Z-score	0.0126***	0.0044***	0.0030***	0.0023***	-0.0003
	(0.0014)	(0.0007)	(0.0004)	(0.0006)	(0.0019)
Constant term	-0.2423***	-0.0355	0.1311***	0.3693***	0.7016***
	(0.0518)	(0.0243)	(0.0222)	(0.0302)	(0.0701)

Notes: These results concern 1678 firms i.e. operating in less foreign banking penetrated countries (number of observations: 11746).* 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. Also, a test is performed confirming that there are statistical significant differences of the credit change coefficients between pre and post crises periods for the 75%, 90% quantiles.

Finally, in the Appendix I (Tables 11-12) we examined these issues for more and less financially developed countries.[13] What we have found is

[13] Global Financial Development Database provides a country-level variable that measures the degree of financial development. Based on this variable, we compute the median of the average scores during the total period under examination. Next we classify the countries in two groups namely more (above the median) and less (below the median) financial developed countries. As more financial developed are characterized the following countries: Germany, Netherlands, Spain, Ireland, Cyprus, Luxembourg, Malta, Portugal, Austria. On the other hand, the group of less financial developed countries includes Slovakia, Estonia, Greece, Italy, Finland, Belgium, France, Slovenia.

that the impact of the credit crunch on firm growth is strong in less financially developed countries (apart from the 90% quantile). On the contrary, the credit crunch is not significant in countries which are more financially developed (apart from the 10% quantile).

6. Conclusions

The primary purpose of the present paper has been to explore the impact of the credit crunch on firm growth and the role of banking structure on this relationship, especially during the recent financial crisis (post-2008). In doing so, the relationship between firm growth and changes in the provision of banking loans is examined for two groups of euro area countries with respect to the degree of foreign bank-penetration. The panel quantile method is applied to 2075 firms operating in the 17 countries of the euro area during the period 2005-2011.

Our basic findings show that pre-crisis firm growth is positively and heavily dependent on changes in bank credit. Nevertheless, in the post-crisis period this strong relationship holds only for slow-growth firms, while it disappears for high-growth firms. This interesting result reveals that high-growth firms seem to be able to have access to alternative external funding sources (stock and bond markets, financial engineering tools, venture capital funds etc.) or to generate more internal finance. Consequently, high-growth firms may already play and, definitely, are expected to play a key role as carriers and facilitators of the credit-less recovery the euro area exhibits following the recent financial crisis.

Furthermore, our findings indicate that financial stability affects firm growth in a positive way, whereas macroeconomic risk has a negative impact, as expected. Initial firm size affects firm growth differently across quantiles. In addition, we find that banking concentration has a significant negative effect on firm growth for the total sample. Hence, the lower the market power in banking industries the easier the firms' access to credit and the higher the growth potential. However, it is noticeable that firm growth is independent of the risk that characterizes a country and structural characteristics of the banking sector for the group of the superfast-growth firms (i.e. the upper quantile-90%). This finding possibly implies that other structural characteristics of these high-quality firms, such as innovative activity, may drive their exceptional growth performance.

We provide empirical evidence that the credit crunch appears to be harmful especially for slow-growth firms operating in countries with domestic bank-dominated systems, while this harmful impact does not hold for those operating in countries where the banking system is dominated by foreign banks. This interesting result could be explained on the grounds of the argument that foreign banks may provide a stabilizing mechanism in a banking system once a crisis occurs because they are able to have access to a more diversified international pool of liquidity compared to domestic banks.

The classification of firms in size groups yields interesting results also: the credit crunch exhibits a strong impact on (the very many) micro and small firms, while it doesn't affect the growth rates of medium-sized and large firms. Finally, separate estimates for more and less financially

developed countries show that the credit crunch matters mainly in countries characterized by a lower degree of financial development.

Appendix A

Table 7: Firm Growth of micro firms in euro area, 2005-2011

	Panel Quantile Regressions				
	10%	25%	50%	75%	90%
Credit %Change*(post-crisis)	0.5019**	0.2262***	0.0457	-0.0144	-0.3092
	(0.2138)	(0.0689)	(0.0702)	(0.0671)	(0.1981)
Credit %Change*(pre-crisis)	0.7765***	0.5083***	0.3637***	0.4639***	0.9283***
	(0.0698)	(0.0330)	(0.0352)	(0.0644)	(0.1315)
Size	0.0348***	0.0102***	-0.0005	-0.0175***	-0.0528***
	(0.0041)	(0.0019)	(0.0014)	(0.0025)	(0.0056)
Liquidity	-0.0070	-0.0037***	-0.0002	0.0019	0.0218
	(0.0065)	(0.0014)	(0.0029)	(0.0063)	(0.0168)
Leverage	-0.0168*	-0.0002	-0.0003	0.0000	0.0012
	(0.0097)	(0.0036)	(0.0003)	(0.0002)	(0.0128)
CR5	-0.1819***	-0.0684***	-0.0471***	-0.0373*	0.0550
	(0.0373)	(0.0156)	(0.0139)	(0.0225)	(0.0521)
Risk	-0.6786***	-0.3884***	-0.3855***	-0.5139***	-0.4059***
	(0.1436)	(0.0585)	(0.0589)	(0.0755)	(0.1576)
Z-score	0.0047***	0.0022***	0.0014***	0.0014**	0.0009
	(0.0009)	(0.0004)	(0.0004)	(0.0006)	(0.0014)
Constant term	-0.4856***	-0.1244***	0.0991***	0.4269***	0.9047***
	(0.0621)	(0.0282)	(0.0238)	(0.0399)	(0.0944)

Notes: Number of observations: 12621. *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. For a definition of micro, small, medium-sized, large firms see footnote 11.

Table 8: Firm Growth of small firms in euro area, 2005-2011

	Panel Quantile Regressions				
	10%	25%	50%	75%	90%
Credit %Change*(post-crisis)	1.4286***	0.9839**	0.4391	0.0915	0.2496**
	(0.4609)	(0.4164)	(0.3240)	(0.2461)	(0.1059)
Credit %Change*(pre-crisis)	0.8589***	0.6703***	0.4390***	0.4935***	0.4106***
	(0.1397)	(0.0853)	(0.0905)	(0.1303)	(0.1517)
Size	-0.0075	-0.0031	0.0040	0.0106	0.0208
	(0.0277)	(0.0121)	(0.0081)	(0.0101)	(0.0339)
Liquidity	-0.0646**	-0.0012	0.0101	0.0140	0.0504**
	(0.0307)	(0.0136)	(0.0091)	(0.0144)	(0.0213)
Leverage	-0.0004	-0.0007	-0.0007	-0.0008	-0.0014
	(0.0275)	(0.0013)	(0.0012)	(0.0019)	(0.0140)

CR5	-0.1322*	-0.0624*	-0.0327*	-0.0229	0.0131
	(0.0809)	(0.0361)	(0.0191)	(0.0247)	(0.0927)
Risk	-0.4495	-0.1884	-0.0715	0.1634	0.2783
	(0.2845)	(0.1658)	(0.1169)	(0.1538)	(0.2603)
Z-score	0.0012	-0.0002	0.0005	0.0003	0.0016
	(0.0023)	(0.0010)	(0.0007)	(0.0009)	(0.0018)
Constant term	0.1799	0.0487	-0.0361	-0.1245	-0.2989
	(0.4445)	(0.1817)	(0.1328)	(0.1563)	(0.5321)

Notes: Number of observations: 1211. *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. For a definition of micro, small, medium-sized, large firms see footnote 11.

Table 9: Firm Growth of medium-sized firms in euro area, 2005-2011

	Panel Quantile Regressions				
	10%	25%	50%	75%	90%
Credit %Change*(post-crisis)	-0.5858	0.5066	0.5699*	0.4822	-1.4052
	(1.0303)	(0.5603)	(0.3441)	(0.5849)	(1.2883)
Credit %Change*(pre-crisis)	0.0094	-0.2588	0.1572	0.0541	0.5223*
	(0.2402)	(0.2498)	(0.1555)	(0.2194)	(0.3083)
Size	-0.0130	0.0052	-0.0153	-0.0526***	-
	(0.0340)	(0.0202)	(0.0151)	(0.0189)	0.0936***
					(0.0277)
Liquidity	-0.1128**	-0.0094	0.0405*	0.0680**	0.1260**
	(0.0464)	(0.0309)	(0.0229)	(0.0317)	(0.0624)
Leverage	-0.4503***	-0.3445***	-0.0583	0.1491***	0.4913***
	(0.0541)	(0.1013)	(0.0475)	(0.0242)	(0.1050)
CR5	0.2447**	0.1545**	0.0435	-0.0537	0.0485
	(0.1104)	(0.0793)	(0.0501)	(0.0759)	(0.1468)
Risk	0.0868	-0.2398	0.1074	0.2979	-0.1309
	(0.5039)	(0.4718)	(0.2453)	(0.3031)	(0.7264)
Z-score	0.0040	0.0052	0.0026	0.0000	0.0030
	(0.0032)	(0.0034)	(0.0021)	(0.0039)	(0.0068)
Constant term	0.1976	-0.0606	0.2092	0.8587***	1.4652***
	(0.6003)	(0.3590)	(0.2680)	(0.3362)	(0.5320)

Notes: Number of observations: 553. *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. For a definition of micro, small, medium-sized, large firms see footnote 11.

Table 10: Firm Growth of large firms in euro area, 2005-2011

	Panel Quantile Regressions				
	10%	25%	50%	75%	90%
Credit %Change*(post-crisis)	-1.9946	0.2981	2.1822***	0.4815	-0.8958
	(1.5996)	(1.4002)	(0.7966)	(1.3152)	(1.3654)
Credit %Change*(pre-crisis)	-0.2931	-0.0329	-0.6745	-0.8533*	-0.3155
	(0.6204)	(0.5795)	(0.5472)	(0.4438)	(0.4497)
Size	-0.3646***	-0.1469	0.0123	-0.0110	0.0706
	(0.0905)	(0.1286)	(0.0805)	(0.0729)	(0.0866)
Liquidity	0.0422	0.0339	0.0293	0.0997	0.1687**
	(0.1331)	(0.0897)	(0.0712)	(0.0652)	(0.0806)
Leverage	-0.3963	-0.1131	-0.2562	-0.1636	0.0807
	(0.2976)	(0.2328)	(0.1691)	(0.1612)	(0.1731)
CR5	0.3715	0.0405	-0.0558	0.1413	0.0491
	(0.2443)	(0.2309)	(0.2257)	(0.1930)	(0.1471)
Risk	-2.9134***	-1.6568*	-0.9391	-0.8773	-0.7325
	(1.0455)	(0.9538)	(0.8948)	(0.7928)	(0.6856)
Z-score	0.0067	0.0039	0.0050	0.0002	-0.0010
	(0.0101)	(0.0086)	(0.0050)	(0.0064)	(0.0063)
Constant term	6.8069***	2.8130	-0.0484	0.3060	-1.2770
	(1.6252)	(2.2880)	(1.4613)	(1.2978)	(1.5410)

Notes: Number of observations: 84. *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. For a definition of micro, small, medium-sized, large firms see footnote 11.

Table 11: Firm Growth in more financial developed countries of euro area, 2005-2011

	Panel Quantile Regressions				
	10%	25%	50%	75%	90%
Credit %Change*(post-crisis)	1.1218***	0.1436	-0.1163	-0.0615	-0.5351
	(0.3317)	(0.1587)	(0.0740)	(0.1153)	(0.3350)
Credit %Change*(pre-crisis)	0.6561***	0.4100***	0.2660***	0.4666***	1.0012***
	(0.1032)	(0.0405)	(0.0419)	(0.0615)	(0.2026)
Size	0.0195***	0.0074***	0.0010	-0.0077***	-
	(0.0035)	(0.0015)	(0.0014)	(0.0021)	0.0286***
					(0.0046)
Liquidity	-0.0235*	-0.0016	0.0073*	0.0129**	0.0395**
	(0.0127)	(0.0055)	(0.0038)	(0.0066)	(0.0156)
Leverage	-0.0921**	0.0002	0.0002	0.0009	0.0485
	(0.0456)	(0.0076)	(0.0011)	(0.0069)	(0.0442)
CR5	-0.1278**	-0.0555**	-0.0298	-0.0419	0.0141
	(0.0628)	(0.0248)	(0.0225)	(0.0293)	(0.0727)

Risk	-0.2052	-0.3092***	-0.4539***	-0.5063***	-0.6778**
	(0.1724)	(0.1034)	(0.0895)	(0.1114)	(0.3471)
Z-score	0.0034***	0.0011**	0.0010*	0.0016**	0.0050**
	(0.0010)	(0.0005)	(0.0006)	(0.0008)	(0.0025)
Constant term	-0.3545***	-0.1118***	0.0669**	0.2744***	0.5886***
	(0.0693)	(0.0330)	(0.0263)	(0.0399)	(0.1025)

Notes: Number of observations: 6510. *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 12: Firm Growth in less financial developed countries of euro area, 2005-2011

	Panel Quantile Regressions				
	10%	25%	50%	75%	90%
Credit %Change*(post-crisis)	0.7524**	0.3545***	0.2139**	0.2465**	0.1221
	(0.3029)	(0.1087)	(0.0906)	(0.1210)	(0.4079)
Credit %Change*(pre-crisis)	0.8513***	0.6919***	0.4892***	0.4888***	0.6526***
	(0.1742)	(0.0661)	(0.0472)	(0.0819)	(0.1664)
Size	0.0230***	0.0038**	-0.0033***	-0.0160***	-
	(0.0031)	(0.0016)	(0.0013)	(0.0016)	0.0364***
					(0.0036)
Liquidity	-0.0048	-0.0043***	-0.0020	0.0019	0.0142
	(0.0044)	(0.0007)	(0.0022)	(0.0058)	(0.0202)
Leverage	-0.0170*	-0.0001	-0.0003	0.0000	-0.0004
	(0.0096)	(0.0027)	(0.0002)	(0.0002)	(0.0091)
CR5	-0.4518***	-0.1623***	-0.0851***	-0.0802***	0.1249*
	(0.0657)	(0.0310)	(0.0235)	(0.0307)	(0.0743)
Risk	-1.2705***	-0.3923***	-0.2174**	-0.3207***	0.0012
	(0.3784)	(0.1223)	(0.0935)	(0.1074)	(0.3351)
Z-score	0.0052*	0.0028***	0.0017***	0.0009	-0.0007
	(0.0028)	(0.0008)	(0.0006)	(0.0008)	(0.0021)
Constant term	-0.0443	0.0192	0.1373***	0.4228***	0.6466***
	(0.1355)	(0.0505)	(0.0403)	(0.0500)	(0.1312)

Notes: Number of observations: 8015. *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.

Appendix B

Figure 3: Quantile 10% of firm growth

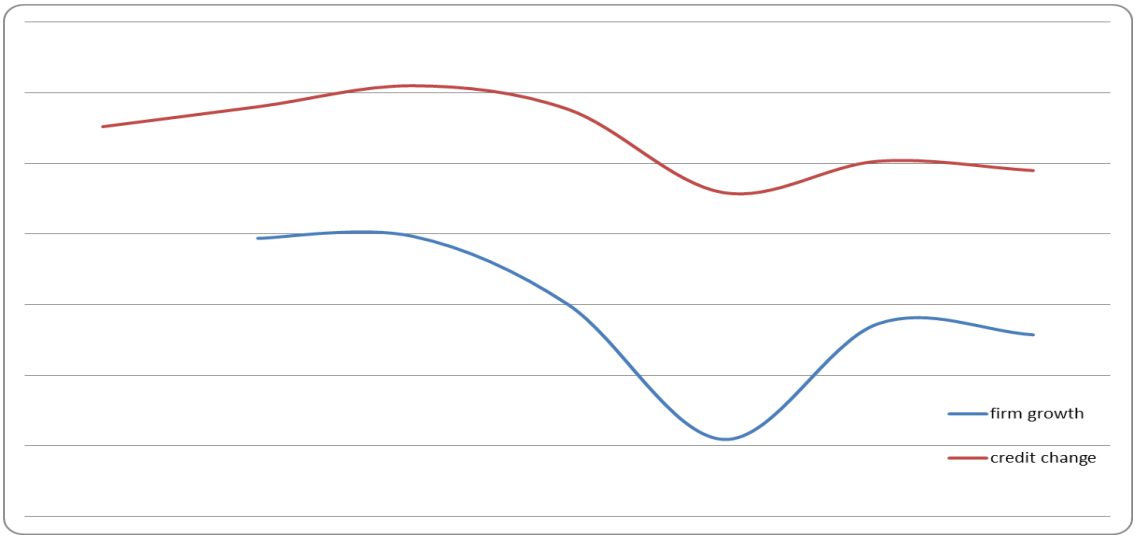
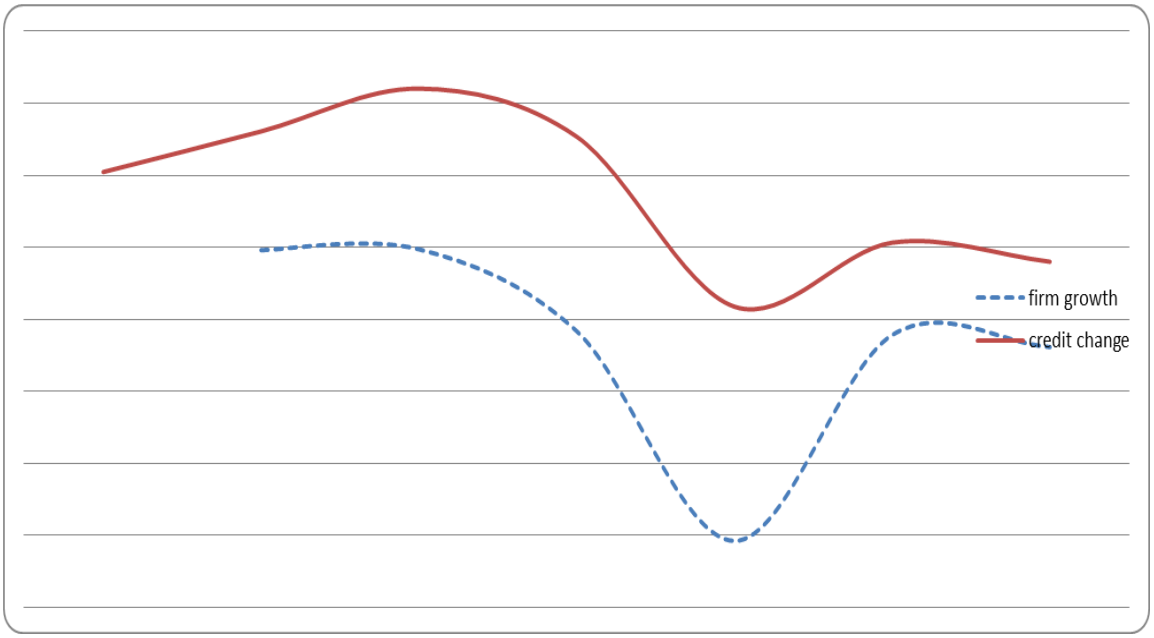


Figure 4: Quantile 25% of firm growth



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