Access to Credit as a Growth Constraint

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ABSTRACT

From a sample of 75,854 Slovenian firms in the period 1995–2011, we examine the effects of a firm's access to bank credit on its growth. The results suggest that as the external financing constraint relaxes and firm gets access to credit, the reliance on internal funds to finance growth decreases. By exploring the role of available collateral in gaining access to bank credit, we find that collateral only helps larger firms to obtain credit more easily. On the other hand, collateral does not reduce micro firms' dependence on internal funds to finance growth, which suggests that even if they have collateral, banks are still unprepared to finance them, possibly due to the level of risk. It could also be that in approving credit to micro firms, other factors such as liquidity or cash flow are more highly considered by banks than the value of collateral.

JEL classification: G30, G21, C23

Keywords: financial constraints, access to credit, firm growth, collateral, dynamic panel

1. INTRODUCTION

According to the neoclassical financial theory (Modigliani and Miller, 1958), investment decisions of firms are not affected by their financing decisions. If all firms have equal access to external financing, their chosen mix between equity and debt is irrelevant in financing firm's growth because external financing provides a perfect substitute for internal funds. In reality, however, firms do not have equal access to external financing sources due to the existing imperfections, which introduce a wedge between the costs of internal and external funds. In a survey among 1,050 CFOs from U.S., Europe and Asia, Campello et al. (2010) find that during the global financial crises in 2008, financially-constrained firms planned deeper cuts in investment and were forced to burn a significantly larger portion of their cash savings relative to unconstrained firms.

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In this paper we explore the effects of a firm's access to bank credit on its potential for growth, taking a large sample of Slovenian firms. The results suggest that all firms, including micro firms, reduce their reliance on internal funds to finance growth once the external financing constraint relaxes and firm is able to obtain credit or increase its level of indebtedness. On the other hand, collateral seems to alleviate the financial constraint problem only for larger firms, but not for micro firms. There are two possible explanations for this finding. First, banks consider micro firms as too risky and are thus unprepared to finance them even if they have enough collateral. Second, in approving credit to micro firms banks could be more focused on other factors, such as the liquidity, cash flow or indebtedness position and not that much on collateral, as they are for larger firms.

This paper contributes to the existing literature related to financial constraints. An extensive literature is available to test the presence and importance of financial constraints with the sensitivity of investment to cash flow. In a classic study, Fazzari et al. (1988) find that those firms that have the lowest dividend-to-income ratio are the most financially constrained and show the highest investment cash flow sensitivity. This means that their investment decisions largely depend on the availability of internal funds. Even though this approach is widely used, it also has some limitations and is subject to some criticisms. Contrary to Fazzari's et al. (1998) conclusions, Erickson and Whited (2000) find no evidence that cash flow belongs in the investment q regression, whether or not firms are financially constrained. Moreover, their estimated cash flow sensitivities are lower for financially constrained firms and in some cases also negative. Agca and Mozumdar (2008) and in a recent study Chen and Chen (2012) show that there has been a steady decrease in investment cash flow sensitivity over time and it has completely disappeared in recent years. Chen and Chen (2012) point out that if one believes that financial constraints have not disappeared, then investment cash flow sensitivity cannot be a good measure of financial constraints. For this reason, researchers started looking for alternative ways to explain why some firms face more obstacles in obtaining external financing sources. Sufi (2009) provides evidence that access to lines of credit as a measure of financial constraints adds valuable information to investment cash flow sensitivity. A similar measure is used by Rahaman (2011) who shows that, as the external financing constraint is alleviated, a firm relies less on internal funds and switches to external financing as the primary source for financing growth.

Our paper extends the findings of Rahaman (2011) by adding the role of collateral in alleviating the problem of external financing constraint. We find, for larger firms, that as their collateral increases, the incremental effect of internal funds on the firm's growth decreases, which suggests that with higher amounts of collateral, they are able to obtain external funds more easily and thus reduce their dependence on internal funds. On the other hand, collateral seems useless for micro firms and does not help them to reduce their reliance on internal funds.

The rest of the paper is structured as follows. The next section describes the data, descriptive statistics, variable definitions and empirical strategy. Section 3 presents the results with different measures of a firm's access to bank credit and robustness checks. Section 4 concludes the paper.

2. METHODOLOGY

2.1. Data, descriptive statistics and variable definition

We have drawn a sample of firms from the database of the Republic of Slovenia's Agency for Public Legal Records and Related Services (AJPES). It contains financial data compiled from balance sheets and income statements of Slovenian legal entities. Sole traders are not included. We use annual data for the period 1995–2011, which is sufficient to observe the growth of firms over the business cycle. Without imposing any restrictions on the data, our sample contains

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729,858 observations for 92,733 different firms, of which 17.4% are represented in all 17 years. Firms with negative equity are excluded from the sample, because these firms do not usually have any potential for growth. Additionally we also exclude firms which reported zero assets or zero turnover, since these are our primary variables of interest. After these restrictions, we are left with 547,945 observations for 75,854 different firms.

We focus on micro firms because many papers found small firms to be more financially constrained. Banks are not willing to finance them because they represent a high credit risk. In accordance with the theory of financial accelerator (Bernanke et al., 1996) small firms experience substantially more pro-cyclical variation in sales because their access to credit is significantly constrained when the recession hits. Similarly, Gertler and Gilchrist (1993) and Campello and Chen (2010) argue small firms are less diversified, more opaque and experience lower access to external financing in adverse macro-economic shocks. In addition to the view that smaller firms hardly ever get credit, Han et al. (2009) and Brown et al. (2011) find that small firms are also less likely to apply for credit due to high interest rates and collateral requirements.

Consistent with this view, we divide our sample into micro and other firms using our own system of classification. Micro firms are those that fulfill two out of the following three criteria: (1) Total assets under EUR 50,000, (2) Total turnover under EUR 50,000, (3) Average number of employees during the business year does not exceed 6. Using these criteria, 24,882 firms are classified as micro firms and represent 20% of all observations in our sample.

Table 1 reports summary statistics for firms' growth, financing sources and other characteristics of the firms. The main dependent variable which interests us is the growth of the firm. We use a firm's i total turnover growth as a measure for its growth which is constructed as $\Delta\log(Total\ turnover)_{it} = \log(Total\ turnover)_{it} - \log(Total\ turnover)_{it-1}$. However, for robustness checks, we use total assets growth as an alternative definition. The dynamics of a firm's growth is notably influenced by the firm's size and age. Micro firms are on average younger and less experienced and their resources are more constrained relative to others. Micro firms are, therefore, more vulnerable in a turbulent environment, especially in macroeconomic downturns or with payment indiscipline.

As empirical literature indicates, the access to external financing sources significantly affects a firm's growth. Due to limited access to external sources, micro firms have to accumulate more internal funds in order to finance their growth (Rahaman, 2011). As can be seen in Table 1, internal funds are a much more important source of financing for micro firms, compared to larger firms. The capital-to-assets ratio is equal to 60% for micro firms, whereas it is 42% for other firms.

To measure a firm's access to external financing, we follow findings of Sufi (2009) who argues, that the degree of access to bank credit facilities is a better measure of a firm's external financing constraints than the traditional investment cash flow sensitivity measure. For this reason, we use different measures to indicate a firm's ability to obtain bank credit.

Firstly, *Firm has credit* is equal to 1 if the firm i is indebted to at least one bank and is 0 otherwise. Only 15% of micro firms have loans, which suggests that in general they are significantly more financially-constrained than larger firms, of which 57% have loans. Smaller firms represent a higher credit risk and thus have more problems in obtaining bank loans. Moreover, as Han et al. (2009) and Brown et al. (2011) find, smaller firms are also discouraged from applying for credit due to asymmetric information, which makes them more risky and increases the costs of borrowing.

Secondly, *Firm has long-term loan* is equal to 1 if the firm i has a long-term loan and 0 if it only has short-term loans. This measure is calculated only for firms which are indebted to at least one bank. The motivation for using it is that firms' investment projects are usually financed with long-term credit, so we can expect those firms with more long-term loans among their liabilities to grow faster. Micro firms are more financially constrained also from this perspective since only 27% have access to long-term bank credit. We use this measure as a robustness check.

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Table1
Summary statistics

	All firms		Micro firms		Other firms	
	Mean	**N**	**Mean**	**N**	**Mean**	**N**
Firm growth						
$\Delta\log(\text{Total turnover})_{it}$	0.098	459,335	0.065	79,892	0.105	379,443
$\Delta\log(\text{Total assets})_{it}$	0.127	459,335	0.062	79,892	0.141	379,443
Internal funds						
Capital to assets (%)	44.0	547,945	60.4	108,963	41.5	438,982
Access to external financing						
Firm has credit (%)	48.9	547,945	15.4	108,963	57.3	438,982
Firm fas long-term credit (%)	53.5	268,104	26.9	16,787	55.7	251,317
Credit to assets (%)	25.3	268,104	30.0	16,787	25.0	251,317
Available collateral (%)	30.8	547,945	25.6	108,963	32.1	438,982
Firm characteristics						
Total turnover (EUR 1000)	1465.7	547,945	26.8	108,963	1822.9	438,982
Total assets (EUR 1000)	1901.7	547,945	53.9	108,963	2360.4	438,982
Age (years)	8.4	547,945	6.4	108,963	8.9	438,982
Leverage (%)	9.0	547,945	3.4	108,963	10.3	438,982

Notes: "*Firm has loan*" is equal 1 if a firm has credit and zero otherwise, "*Firm has long-term loan*" is equal 1 if a firm has long-term loans credit and zero if it has short-term loans only, "*Available collateral*" is defined as tangible assets (including investment property)/total assets, "*leverage*" is defined as long-term debt/total assets.

Source: AJPES, own calculations.

Thirdly, *Credit to assets*, which is defined as the sum of short-term and long-term credit over total assets. Like *Firm has long-term* credit, it is calculated only for firms which have credit. Results in Table 1 suggest, that if micro firms have access to credit, they borrow to a higher degree of indebtedness than larger firms. A similar measure of financial constraints is also used by Rahaman (2011) who finds that once the external financing constraint is alleviated, the firm relies less on internal funds and switches to external financing as its primary source for financing growth.

Fourthly, *Available collateral*, which is defined as tangible assets (including investment property) in firm's total assets. Higher values of collateral may help firms to overcome the problem of asymmetric information and obtain credit more easily (Chava and Purnanadam, 2011). In addition to being worse risks, Table 1 indicates micro firms also have lower proportion of available collateral (7pp lower than larger firms), which could put them in a challenging position in obtaining credit.

2.2. Empirical strategy

The empirical model that we estimate has the following specification:

$$Y_{it} = \alpha Y_{it-1} + \beta X_{it} + \eta_i + \varepsilon_{it} \quad (1)$$

where Y_{it} is the growth of firm i between period t and t–1 which is approximated by total turnover growth, X_{it} is the vector of firm specific variables measuring size, age, leverage, available

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collateral, different sources of financing and interaction effects between internal funds and firm's ability to obtain external financing, η_i is unobserved firm-specific effect and ε_{it} is the error term.

Estimating dynamic panel data model leads to several econometric problems. As summarized by Bond (2002) the OLS estimator is inconsistent due to the correlation between Y_{it-1} and individual specific effect η_i and this correlation does not disappear as the number of observations in the sample gets larger. A similar point also holds for the random effects estimator which, like OLS, does not eliminate η_i. The within estimator eliminates this source of endogeneity by subtracting the individual means for each firm i. Since η_i is time invariant it is removed from the transformed equation. However, the endogeneity problem still remains, since within transformed lagged dependent variable $(Y_{it-1} - \bar{Y}_{i,-1})$ is correlated with within transformed error term $(\varepsilon_{it-1} - \bar{\varepsilon}_i)$. First differencing transformation also eliminates the individual effects η_i from the model

$$\Delta Y_{it} = \alpha \Delta Y_{it-1} + \beta \Delta X_{it} + \Delta \varepsilon_{it} \tag{2}$$

but cause the correlation between lagged dependent variable $(Y_{it-1} - Y_{it-2})$ and $(\varepsilon_{it} - \varepsilon_{it-1})$. Since first differencing does not introduce all realizations of the errors into $\Delta\varepsilon_{it}$, this problem can be solved using instrumental variables that are correlated with ΔY_{it-1} and orthogonal to $\Delta\varepsilon_{it}$. Arellano and Bond (1991) derive a consistent GMM estimator using lagged levels $(Y_{i1}, Y_{i2}, \ldots, Y_{iT-2})$ as instruments. Blundell and Bond (1998) find that lagged level instruments may become weak as the autoregressive process becomes too persistent or the ratio of the variance of firm-level effects η_i to the variance of the error ε_{it} becomes too large. They develop an approach outlined in Arellano and Bover (1995) where in addition to the moment conditions of lagged levels as instruments for the differenced equation they also use moment conditions in which lagged differences are used as instruments for the level equation. This so-called system-GMM model can be estimated if instrumental variables are uncorrelated with individual specific effects η_i.

We believe that the Blundell-Bond approach is more suitable for our model since it also enables us to include time invariant regressors like sector dummies which capture different growth potentials across sectors. Moreover, system GMM estimator is more robust for unbalanced panels since lagged observations enter the equation as instruments instead of explicitly as regressors. However, we also estimate the Arellano-Bond model for a robustness check.

As recommended by Roodman (2006), time dummies are included in the models. This helps to fulfill the assumption of no correlation in idiosyncratic disturbances. In the two-step GMM estimator, standard errors tend to be too small, for this reason we use variance correction proposed by Windmeijer (2005). We report two diagnostic tests: First, the Sargan test of over-identifying restrictions which tests for the validity of instruments. A rejection of the null hypothesis implies the instruments do not satisfy orthogonality conditions. Second, the Arellano and Bond (1991) test for autocorrelation in residuals. First-order serial correlation in differences is always present since $(\varepsilon_{it} - \varepsilon_{it-1})$ is related to $(\varepsilon_{it-1} - \varepsilon_{it-2})$. To check for first-order serial correlation in levels we look for second-order serial correlation AR(2) in differences. A rejection of the null hypothesis indicates autocorrelation in residuals.

3. RESULTS

This section reports estimated impacts of various firm characteristics and financing sources on firms' growth. Results are divided into three parts. First, a binary variable *Firm has credit* is used as an indicator for firm's access to credit. Second, we focus only on firms that have credit and check how level of indebtedness to banks, which is measured with *Credit to assets*, influences their growth. Third, we make several robustness checks with alternative estimator, alternative definitions of variables and estimation on a subsample of firms. Similar as Rahaman (2011), we

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include interaction effects between internal funds and access to external financing sources to check if the importance of internal funds for firm growth decreases once the external financing constraint is alleviated. Since smaller firms are more financially constraint and rely more on internal funds, we estimate these effects separately for micro and other firms. In interpreting the results we focus on the role of different financing sources for firms' growth.

3.1. *Access to credit and growth of the firm*

In Table 2 we present the results separately for all firms, micro firms and other firms. *Internal funds growth*, which is defined as $\log(\textit{Owner's equity})_{it} - \log(\textit{Owner's equity})_{it-1}$, has positive and highly statistically significant effect on firm growth for all three subsamples of firms. This interpretation holds irrespective of the values of *Available collateral* and *Firm has credit* which are interacted with $\Delta\log(\textit{Internal fund})_{it}$. Internal sources can be directly used to finance new projects, so higher accumulation of internal funds allows firms to obtain higher growth rates. In addition, Almeida and Campello (2010) and Sufi (2009) find that higher level of internal funds also increases firm's access to external financing sources, which can have an additional positive effect on growth.

The importance of internal funds for firm growth is more pronounced for micro firms. Smaller firms may have difficulties in obtaining bank credit because they are less diversified and represent higher credit risk to lenders. This external financing constraint problem further increases in recession, when banks switch to better quality borrowers (Bernanke et al., 1996). For this reason, smaller firms have to rely more on internal funds to finance new projects. Since outside sources of financing are less available for smaller firms, they are also more careful with allocating funds and invest more to highly efficient segments (Hovakimian, 2011).

Collateral that firms possess can help them to alleviate the financial constraint problem and obtain external funds more easily. In empirical specifications (1), (3) and (5) we include interaction terms between *Internal funds growth* and *Available collateral*. The effect is negative, meaning that higher values of collateral reduce the effect of internal funds on firm growth. This suggests that with higher values of collateral firms can obtain credit more easily and thus reduce their dependence on internal funds to finance growth. While this effect is highly statistically significant for all firm and other firms it is not significant for micro firms. This means that collateral doesn't help micro firms to reduce their dependence on internal funds. A possible reason for this is that even if they have collateral, banks are still unprepared to finance them due to the level of risk they pose. In the case of a default, bank would need to seize these assets and sell them at current market prices, which is costly and exposes the bank to market risk, so they prefer to give credit to firms with a lower probability of default. The reason could also be that in approving credit to micro firms, banks are more focused on other factors, such as liquidity, cash flow or indebtedness position and not that much on the collateral.

In specifications (2), (4) and (6) we include interaction effects between internal funds growth and binary variable which is equal to 1 if *firm has credit*. The effect is negative and highly statistically significant for all sub-samples of firms and suggests that as the external financing constraint is alleviated, the effect of internal financing on firm growth decreases. Once firms get access to bank credit they rely less on internal funds to finance new investment projects. This result is consistent with Rahaman (2011) who uses *Short-term bank loans and overdrafts/Total liabilities* as a measure of firm's access to bank credit facility. We use a similar measure in the following section.

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Table2
Access to credit and firm growth

	All firms		Micro firms		Other firms	
	(1)	(2)	(3)	(4)	(5)	(6)
Total turnover growth$_{it-1}$	-0.047***	-0.047***	-0.090***	-0.090***	-0.038***	-0.038***
	(0.004)	(0.004)	(0.008)	(0.008)	(0.005)	(0.005)
log(Total assets)$_{it-1}$	-0.312***	-0.309***	-0.342***	-0.341***	-0.309***	-0.307***
	(0.007)	(0.007)	(0.018)	(0.018)	(0.008)	(0.008)
log(Age)$_{it-1}$	-0.086***	-0.087***	-0.089***	-0.089***	-0.085***	-0.086***
	(0.011)	(0.011)	(0.024)	(0.024)	(0.013)	(0.013)
Leverage$_{it-1}$	0.241***	0.236***	0.232***	0.230***	0.243***	0.236***
	(0.019)	(0.019)	(0.067)	(0.067)	(0.020)	(0.020)
Available collateral$_{it-1}$	0.260***	0.227***	0.182***	0.178***	0.270***	0.233***
	(0.016)	(0.016)	(0.031)	(0.031)	(0.018)	(0.018)
Δlog(Internal fund)$_{it}$	0.268***	0.296***	0.292***	0.300***	0.263***	0.292***
	(0.008)	(0.008)	(0.016)	(0.012)	(0.009)	(0.010)
Firm has credit$_{it-1}$	0.039***	0.057***	-0.020	-0.018	0.047***	0.067***
	(0.005)	(0.005)	(0.015)	(0.015)	(0.006)	(0.006)
Δlog(Int. f.)$_{it}$*Av. coll.$_{it-1}$	-0.155***		-0.029		-0.169***	
	(0.019)		(0.039)		(0.021)	
Δlog(Int. f.)$_{it}$*Firm has cr.$_{it-1}$		-0.129***		-0.074***		-0.128***
		(0.009)		(0.024)		(0.011)
Constant	4.000**	4.036**	5.186	5.118	3.620*	3.654*
	(1.581)	(1.570)	(6.585)	(6.497)	(2.105)	(2.109)
No. of observations	398154	398154	63222	63222	334932	334932
No. of firms	54105	54105	12520	12520	41585	41585
Sargan test (p-value)	0.272	0.334	0.215	0.216	0.193	0.245
AR(2) test (p-value)	0.274	0.266	0.937	0.918	0.292	0.306

* p < 0.10, ** p < 0.05, *** p < 0.01; Windmeijer (2005) bias-corrected robust standard errors in parentheses.
Notes: All the models are estimated with the Blundell-Bond (1998) system-GMM estimator for the period 1995–2011. The dependent variable in the regressions is the firm's *i* total turnover growth, calculated as $\Delta\log(Total\ turnover)_{it}$. "*Total assets*" is the book value of the firms' assets from the balance sheet, "*Age*" is the age of the firm in years, "*Leverage*" is defined as Long-term debt/Total assets, "*Available collateral*" is defined as Tangible assets (including investment property)/Total assets, "*Internal fund*" is defined as Owner's equity, "*Firm has credit*" is equal 1 if firm has credit and zero otherwise. We control for time and sector effects.
Source: AJPES, own calculations.

These results build on the findings of Rahaman (2011) by showing the role of collateral to overcome the financial constraint problem. All the firms, including micro firms, reduce their reliance on internal financing sources to finance growth once they are able to obtain credit. On the other hand, collateral which serves to alleviate the financial constraint problem, seems useful only for larger firms, but not for micro firms. Even if they have collateral, it does not reduce the effect of internal funds on firm growth. This suggests that banks are probably prepared to finance micro firms only if they have persuasive investment projects with sufficient future cash flows, enough liquidity and low probability of default.

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3.2. Access to credit and firm growth: The level of indebtedness to banks

In Table 3 we present estimated models in which instead of binary variable *Firm has credit* to measure firm's access to bank credit, we now use the level of indebtedness to banks – *Credit to assets*. All these models are estimated only for firms that are indebted to at least one bank, for this reason, the number of observations is considerably lower comparing to results in Table 2. We exclude control variable *Leverage* since it is highly correlated with *Credit to assets*.

The proportion of credit in firm's assets has positive and highly statistically significant effect on firm growth. Higher financial leverage allows firms to invest more and thus grow faster. If firms are not able to obtain enough credit, they have to rely more on internal funds to finance new projects, which may represent a growth constraint when they are unable to provide enough internal funds to finance new investment projects. The effect of *Credit to assets* on growth is significantly larger for micro firms. Since it is much more difficult for micro firms to obtain credit, they use it as efficiently as possible once they get it and invest in high profitable projects.

Table3
Access to credit and firm growth: The level of indebtedness to banks

	All firms		Micro firms		Other firms	
	(1)	(2)	(3)	(4)	(5)	(6)
Total turnover growth$_{it-1}$	-0.036***	-0.036***	-0.114***	-0.115***	-0.031***	-0.031***
	(0.007)	(0.007)	(0.022)	(0.022)	(0.007)	(0.007)
log(Total assets)$_{it-1}$	-0.208***	-0.207***	-0.280***	-0.278***	-0.206***	-0.206***
	(0.011)	(0.011)	(0.050)	(0.050)	(0.011)	(0.011)
log(Age)$_{it-1}$	-0.135***	-0.135***	-0.260***	-0.258***	-0.129***	-0.130***
	(0.018)	(0.018)	(0.085)	(0.085)	(0.019)	(0.019)
Available collateral$_{it-1}$	0.220***	0.202***	0.076	0.084	0.223***	0.203***
	(0.023)	(0.023)	(0.078)	(0.077)	(0.024)	(0.024)
Credit to assets$_{it-1}$	0.279***	0.291***	0.506***	0.535***	0.268***	0.280***
	(0.022)	(0.022)	(0.091)	(0.093)	(0.022)	(0.023)
Δlog(Internal fund)$_{it}$	0.193***	0.179***	0.187***	0.268***	0.193***	0.175***
	(0.011)	(0.009)	(0.046)	(0.043)	(0.011)	(0.009)
Δlog(Int. f.)$_{it}$*Av. coll.$_{it-1}$	-0.094***		0.062		-0.102***	
	(0.021)		(0.088)		(0.021)	
Δlog(Int. f.)$_{it}$*Cr. to as.$_{it-1}$		-0.070***		-0.162*		-0.067**
		(0.026)		(0.097)		(0.027)
Constant	3.453**	3.463**	0.818	0.775	3.381**	3.395**
	(1.687)	(1.687)	(4.212)	(4.215)	(1.419)	(1.427)
No. of observations	188588	188588	10793	10793	177795	177795
No. of firms	35403	35403	4109	4109	31294	31294
Sargan test (p-value)	0.753	0.772	0.601	0.600	0.496	0.522
AR(2) test (p-value)	0.748	0.722	0.159	0.167	0.678	0.657

* p < 0.10, ** p < 0.05, *** p < 0.01; Windmeijer (2005) bias-corrected robust standard errors in parentheses.
Notes: All the models are estimated with the Blundell-Bond (1998) system-GMM estimator for the period 1995–2011. The dependent variable in the regressions is the firm's *i* total turnover growth, calculated as $\Delta\log(Total\ turnover)_{it}$. "*Total assets*" is the book value of the firms' assets from the balance sheet, "*Age*" is the age of the firm in years, "*Available collateral*" is defined as Tangible assets (including investment property)/Total assets, "*Credit to assets*" is defined as All liabilities to banks/Total assets, "*Internal fund*" is defined as Owner's equity. In all the estimates we control for time and sector effects.

Source: AJPES, own calculations.

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The interaction term between *Internal funds growth* and *Credit to assets* is negative and consistent with Rahaman (2011). This result shows that as the external financing constraint relaxes and a firm is able to obtain more credit, the incremental effect of internal financing on firm growth decreases. Although significant only at 10% level, this effect is substantially more important for micro firms. These firms are more likely to be more financially constrained, so once they are able to increase indebtedness to banks, they reduce reliance on internal funds to a much greater extent than larger firms.

Empirical specification (3) confirms again that collateral does not help micro firms to achieve higher growth rates. The coefficient of *Available collateral* and its interaction with *Internal funds growth* are both statistically insignificant. As in the previous section, this suggests that even if they have collateral, they cannot reduce their reliance on internal funds to finance growth.

3.3. Robustness checks

In this section we show that our results are robust to different model specifications. We perform four robustness checks:

First, instead of the Blundell-Bond (1998) estimator we apply the Arellano-Bond (1991) estimator. This model is estimated only in differences, so sector dummies, which are time invariant are now dropped from the estimation. Another consequence of differences is that we lose approximately 50.000 observations. We use the same model specification as before, with one lag of the dependent variable and the same number of instruments. The signs of all the coefficients are the same as with the Blundell-Bond estimator. Also the magnitude of coefficients is very similar. All the models also fulfill the Sargan and Arellano-Bond tests for autocorrelation in residuals. Thus, our results are robust to alternative estimator.

Second, we restrict our dependent variable between 1st and 99th percentile of the distribution. Our results could be driven by outliers with large negative or large positive growth rate, so we drop all the observations at the 1st and 100th percentile of the distribution of total turnover growth. By doing this we lose approximately 5,000 observations. The signs of coefficients do not change and magnitudes are also similar to before. The only change is that with the same specifications as presented in the text, some models do not pass the autocorrelation test. Since our original models pass all the tests and give actually the same results as models with excluded outliers, we conclude that our findings are not driven by outliers.

Third, we use an indicator if *Firm has long-term credit* instead of *Firm has credit*. The motivation for this is that long-term credit represents more stable source of financing and firms usually finance investment projects with long-term debt. For this reason, we construct a binary variable, which is equal 1 if firm has long-term credit and is zero if firm only has short-term credit. All these models are estimated only for the firms that are indebted to at least one bank. Using *Firm has long-term credit* instead of *Firm has credit* does not change our conclusions. As in the previous results, we find that collateral can help to alleviate the financial constraint problem of larger firms, but not for micro firms.

Fourth, we use *Total assets growth* as a measure of firm growth. Instead of $\log(\textit{Total assets})_{it}$ as a measure for firm size, we now use $\log(\textit{Total turnover})_{it}$. The magnitudes of the coefficients are now changed due to the different definition of the dependent variable, but the signs of coefficients are still the same, which suggests that our results are robust to different specification of dependent variable.

4. CONCLUSIONS

In this paper we focus on the question: How a firm's access to bank credit affects its growth? We explore how the availability of bank credit influences firms' dependence on internal funds

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to finance their growth. The literature reports that the dependence of investment on cash flow has vanished (Chen and Chen, 2012) and that the access to bank credit facility is more powerful measure of financial constraint (Sufi, 2009). Therefore, we use a variety of variables, which indicate the firm's ability to obtain credit. Among them, we particularly focus on available collateral, which is used by banks to hedge themselves in case of a debtor's default. It also deepens the understanding of different firms' investment behaviour. By adding the role of collateral, this paper extends the findings of Rahaman (2011).

On a sample of 75,854 Slovenian firms over the last 17 years, we find, as do others, that greater availability of external sources of funding reduces firms' dependence on internal resources. Firms, which can overcome the financial constraint problem and can access bank credit, are less dependent on internal funds and are able to achieve higher growth rates. Collateral, which serves to alleviate the financial constraint problem, seems useful only for larger firms. Once they have a sufficient amount of collateral they can obtain more credit and thus reduce dependence on internal funds. On the other hand, collateral does not help micro firms to reduce their dependence on internal funds, which suggests that collateral does not help them in obtaining credit. This could be due to the high probability of their default, which makes them too risky for banks to be willing to advance credit even if they have enough collateral to pledge, or due to the banks giving more consideration to other factors in granting credit to micro firms, factors such as liquidity or cash-flow position.

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