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Access to Credit and Growth of Firms*

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Abstract

The aim of the paper is to analyze the employment and sales growth of companies in transition countries of Eastern Europe and Central Asia that have obtained bank credit in the aftermath of the global financial crisis. It is shown, using a treatment effects model, that loans are negatively and positively related to employment growth and sales growth, respectively. Loans that completely remove any restrictions to accessing finance do not have a positive effect on sales growth.

1. Introduction

The sources and implications of barriers to accessing external finance have been studied extensively by financial and monetary economists. Borrowing constraints have been found to impair firms' performance and be one of the channels of the monetary policy transmission mechanism. Conversely, financial development which ensures the availability of external finance is considered to enhance economic growth. While there is abundant research on the consequences of credit constraints at the firm level and financial depth at the macroeconomic level, literature about the performance of firms with access to bank financing is scarce. This paper is an attempt to fill this void.

The aim of the paper is to analyze the employment and sales growth of companies in transition countries of Eastern Europe and Central Asia that have obtained bank credit in the aftermath of the global financial crisis. The contribution of this paper is twofold. First, the consequences of a loan extension, which is deemed to be a treatment variable which affects firms' performance, is investigated instead of liquidity constraints which have been subjected to extensive research. Second, it is shown that access to credit in the period following financial disturbances can have diverse effects on the two standard measures of growth of firms, i.e. increase in sales and employment.

Transition countries have witnessed vigorous growth of domestic credit to the private sector which, according to the World Bank Development Indicators data, tripled from an average of only 17 percent of GDP in 1995 to 50 percent on average in 2012. These figures are low compared to the world average (112 percent in 1995 and 131 percent in 2012), but the group of transition countries outpaced other regions in terms of the rate of growth of credit to the private sector.

The development of financial markets in transition markets encourages an alternative analysis of the consequences of credit extension rather than credit denial. The data from 116 countries collected by the World Bank Enterprise Survey (Kuntchev et al. 2013) revealed that liquidity constraints are not very stringent for companies in

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Central Europe and Eastern Asia. 74% of small and medium enterprises in the region did not apply for loans because they had enough capital or had already applied and received bank financing. The corresponding figure was 43% in the Middle East and North Africa, 47% in Sub-Saharan Africa, 63% in East Asian and Pacific countries, and 69% in Latin America and the Caribbean. The fraction of fully credit-constrained firms whose applications were rejected, or which did not apply for a loan because of unfavorable terms and conditions, equals 10% in Eastern Europe and Central Asia, which is only slightly higher than the record low level of 9% observed in Latin America and the Caribbean. The apparent contradiction between a lag in the financial development of Central Europe and Eastern Asia and the mild financial constraints faced by firms can be explained by a reliance on other sources of external and internal finance. All these facts make the case for studying the effects of bank financing at the firm level in Central Europe and Eastern Asia.

Moreover, the severity of the global financial crisis varied in the region, ranging from a deep output collapse in the Baltics and Bulgaria to just a slowdown of growth in Poland[1]. The starting point for the recovery from the global financial crisis is therefore different in this group of countries; this ensures the representativeness of the sample and allows the findings to be generalized.

The rest of the paper is structured as follows. In the next section the literature devoted to the impact of financial development and financial constraints on growth of nations and firms is reviewed. In section 3, I provide arguments that a firm's performance depends on whether or not a bank loan is taken, irrespective of the amount borrowed. I then formulate the hypotheses which are empirically tested in Section 5, using the methodology described in Section 4. The results are summarized, and conclusions are drawn in section 6.

2. Benefits of Access to External Finance

2.1 Financial Development and Growth

The development of credit markets is usually equated with their depth, measured by domestic credit to the private sector in percent of GDP. As has been mentioned, the research on the finance–growth nexus at the country level is plentiful. The interested reader is advised to consult the references in the meta-analysis by Arestis et al. (2015) and Valickova et al. (2015). The search for empirical studies on the link between financial development and growth resulted in 1,151 observations of the estimated coefficients of financial development in growth regressions. The authors found that bank-based measures of financial development (credit-to-GDP ratio) were statistically insignificant in all model specifications. By contrast, liquid liabilities and market-based variables (stock market capitalization) were positively associated with growth. The prominent role of the stock markets in fostering economic growth was

[1] The crisis was accompanied by a decrease in bank lending activity. Its magnitude depended to a large extent on institutional factors (Kapounek, 2017). Iwanicz-Drozdowska et al. (2017) provide evidence that stability of banking sector in Central. Eastern and South-Eastern European countries was fostered by positive macroeconomic development.

confirmed by a meta-analysis of Valickova et al. (2015)[2].

The fact that bank-based measures of financial development in growth regressions are not statistically significant may be caused by the non-linearity of the relationship. Arcand et al. (2015) showed that the marginal effect of financial depth on output growth becomes negative when credit to the private sector reaches 80–100% of GDP. Other examples of recent empirical research which suggest there might be limits to the benefits of financial development include Rioja and Valev (2004), Shen and Lee (2006), and Cecchetti and Kharroubi (2012). Fagerberg and Srholec (2016), who studied post-crisis growth performance, conclude that while access to finance may be essential for growth and development, "too much finance" may be a drag on growth because it may lead to increased volatility and crowding out of resources from other sectors of the economy. The negative influence of excessive financial development at the firm level was corroborated by Coricelli et al. (2012) who confirmed that total factor productivity (TFP) growth in Central and Eastern European countries increases with book leverage until the latter reaches a critical threshold.

2.2 Impact on Employment of Credit Supply Shocks and Debt

The 2008 financial crisis sparked research into the impact of credit supply shocks on corporate outcomes. For the UK, Franklin et al. (2015) found that a 10% contraction in credit supply reduced labor productivity by 5–8% and that firms experiencing adverse credit shocks were more likely to fail. Popov and Rocholl (2018) studied the impact on the labor decisions of 30,000 firms of the funding shock to German savings banks. They found that firms with credit relationships with affected banks experienced a significant decline in employment relative to firms with credit relationships with healthy banks.

For the US, Greenstone et al. (2014) found that the 2007–2009 lending shocks accounted for statistically significant but economically small declines in employment. Chodorow-Reich (2014) presented evidence that firms that had pre-crisis relationships with less healthy lenders had a lower likelihood of obtaining a loan during the crisis, paid a higher interest rate if they did borrow, and reduced employment more than pre-crisis clients of healthier lenders. The negative effect of financial shocks on employment, which mostly affected workers with temporary contracts, was detected also in Italy by Berton et al. (2018).

Evidence from a survey by Campello et al. (2010) of chief financial officers in 39 countries in North America, Europe and Asia after the global financial crisis indicated that constrained firms planned deeper cuts in technology spending, employment, and capital spending. Their findings corroborated the earlier analysis based on a survey of US managers conducted by Kaplan and Zingales (1997) which revealed that constrained firms grow less and invest less.

In a similar vein, Ferrando and Mulier (2015b) investigated the behavior of discouraged borrowers in the euro area, that is firms that needed external finance but did not apply for a bank loan because they feared that their application would be rejected. The empirical results showed that in the two years following the

[2] There is also evidence for transition countries (Gurgul and Lach, 2012) suggesting that causality is running from stock market development to economic growth and from economic growth to banking sector development.

discouragement, investment and employment growth were, respectively, 4.7 and 2.7 percentage points lower than for firms that did apply for finance.

Many of the studies reviewed so far point to a negative impact of financial constraints on firms' output and employment growth. However, periods after financial crises can be marked by diverse output and employment dynamics known as "jobless recovery". According to Calvo et al. (2012), firms tend to employ more capital-intensive techniques because physical capital can serve as collateral, which is scarce after financial crises. Thus, substitution of capital for labor enables firms to overcome contraction of collateral constraints. The Authors tested the role of collateral crunch after financial crises for the sample of developed countries and confirmed the association between collateral variables and jobless recoveries.

The practice of retaining superfluous workers in recessions instead of making them redundant can be regarded as an investment which is subject to financial constraints. Firms with wider access to external financing do not substantially reduce their workforce in recessions and consequently do not have to hire in recoveries. This implies that jobless recoveries are more likely among less financially constrained firms. Bäurle et al. (2018) used data on Swiss firms from all sectors to confirm that financially constrained firms reduce their labor force more when demand decreases and hire more labor when demand increases. Siemer (2019) also found that financially constrained firms, especially young ones which lacked established lending relationships, reduced their employment levels more during the 2007–2009 recession in the United States.

Although the impact of financial constraints on employment and output is relevant for this paper, my main interest is in the implications of having a loan, i.e. of being indebted. According to Jensen (1986), debt can be a powerful governance mechanism which, by imposing systematic interest and principal payments, limits the scope of managers' discretionary decisions about investment and growth. This disciplining role of debt partly solves the problem of the conflicting interests between managers, who tend to overinvest because they personally benefit from growth (Murphy, 1985), and company owners. It turns out, however, that sales growth may be unprofitable. Brush et al. (2000) documented that US firms with free cash flow (i.e. cash flow in excess of that needed to launch investment projects with positive net present value) gained less from sales growth than firms without free cash flow.

There is ample evidence that leverage can improve managerial incentives and reduce the inclination to invest in unprofitable growth of firms. O'Brien and David (2009) highlighted the difference between transactional and relational debt in curbing the tendency of managers to over-invest in growth. Transactional debt, such as bonds, is supplied by lenders who do not hesitate to liquidate companies in distress to recoup their losses. Relational debt is often based on long-term relationships between borrower and lender and imposes less tight budget constraints, meaning that banks and other relational lenders are more tolerant of firms' excessive growth. O'Brien and David (2009) tested this proposition using data on Japanese companies and found that the negative relationship between a lack of profitable growth opportunities and firm growth is weakened in firms that use relational debt.

In Sweden, highly leveraged firms in distressed industries faced relatively lower sales growth but were able to retain relatively higher growth in profitability (Asgharian, 2003). This finding suggests that the highly leveraged firms, possibly

instigated by their creditors, resisted the temptation to retain product lines with low profitability. Heisz and LaRochelle-Côté (2004) found that Canadian manufacturers with higher leverage tended to downsize the workforce more than firms with average leverage in response to an identical drop in product demand. During the global financial crisis, more highly leveraged US firms experienced significantly larger employment losses in response to the decline in local consumer demand (Giroud and Mueller, 2017). In Spain, a significantly negative impact of debt on employment was exerted only by debt above 60% of the sum of gross operating profit and financial revenue of firms (González and Martínez-Carrascal, 2017).

3. Bank Loans as a Treatment to Improve Firms' Performance

The review of literature on the finance–growth nexus highlighted the difference in approaches taken in research conducted at the country and firm levels. Cross-country studies focus on the role of financial development per se by looking into the impact of the amount of credit in the economy on the growth rates of GDP or productivity. By contrast, the most common approach to studying firms' performance is to investigate the consequences of access-to-finance obstacles and liquidity constraints[3]. This paper represents a rare attempt to examine the implication of access to credit for sales and employment growth in firms.

The second novel feature of the paper is that it defines taking out a loan as a treatment variable; I presume that getting access to credit affects a firm's performance regardless of the amount borrowed. In other words, I hypothesize that receiving bank financing brings benefits which are independent of the value of a loan. This presumption is based on the following premises.

First, a borrower's behavior is subject to bank monitoring. Banks perform monitoring and screening activities to reduce the risk of moral hazard behavior on the part of the borrower, thereby reducing credit risk. Banks have informational advantages over financial intermediaries in monitoring borrowers (Fama, 1985); they also exploit economies of scale in monitoring and have low costs of delegation (Diamond, 1984). Rajan (1992) theorized that an informed bank is able to control the firm owner's decision such that the investment project is continued only if it has positive net present value. However, monitoring is costly as the bargaining power of banks over a firm's profits adversely affects the owner's incentive to exert effort.

It is difficult to assess empirically how successful bank monitoring is because of the lack of measurement of borrowers' opportunistic behavior. Ahn and Choi (2009) used the extent of earnings management in the US to measure the competency of business borrowers' management and the reliability of the borrowers' financial statement. Their analysis suggested that a borrowing firm's earnings management behavior decreases as the intensity of bank monitoring increases. This conclusion was rejected by Jha et al. (2015), who found that earnings management in India was higher when monitoring is high, unless the firm is close to default. Whether bank monitoring curbs or provokes corporate misbehavior is not important from the perspective of this paper. What matters is that the fact that being monitored affects firms' behavior.

[3] Minetti and Zhu (2011) is an example of application of the endogenous treatment effects model to estimate the impact of credit constraints on the performance of firms (i.e. the intensive margin of exports of Italian firms).

The second reason to interpret a loan extension as a treatment is related to the monitoring functions of banks. Bank monitoring enhances borrowers' credibility and market value. There is ample evidence that announcements of bank loan agreements produce a positive stock price response (James, 1987). The positive wealth effects are likely to depend on weak internal corporate governance (Byers et al., 2008). They can also depend on the geographical origin of the lender (Ongena and Roscovan, 2013). The abnormal returns over the 3 years following a loan announcement are probably not different in the long run from the returns associated with equity offerings or public debt issues (Billet et al., 2006). However, the evidence is consistent with the view that banks play an important role as transmitters of information in capital markets (Lummer, 1989).

Reputation building is the third benefit of obtaining bank financing, irrespective of the amount borrowed. Diamond (1991) argued that firms borrow and repay bank loans to establish a good credit history and to be able to acquire financing from the public debt market. Datta et al. (1999) documented that that the existence of bank debt lowers the at-issue yield spread for first bond offers by about 68 basis points. Moreover, repeated lending can reduce information asymmetries between the borrower and lender and improve the terms of loan contracts. Borrowers with longer banking relationships not only pay lower interest rates (Bharath et al., 2011) but also are less likely to pledge collateral (Berger and Udell, 1995). Obtaining a banking relationship-backed loan can also significantly increase the probability of a firm's emergence from distress (Rosenfled, 2014). Finally, lenders are more likely to extend credit to firms with which they have a pre-existing relationship (Cole, 1998).

In summary, there are three sound reasons to analyze the implications of gaining access to credit (whatever is its value) on a firm's performance. Bank monitoring, market value effects and establishment of a banking relationship affect a borrower's behavior and a firm's prospects. Last but not least, the availability of data is an argument in favor of using information on access to credit, whether or not a firm reveals the amount borrowed. In the analyzed group of companies from Central Europe and Eastern Asia (see next section), around 24 percent of respondents from firms with a line of credit or a loan refused to reveal or did not know the amount borrowed. As can be seen from Table A3 in the appendix, these firms differ from other borrowers in terms of the many characteristics which are used as variables in the regression model. Excluding them from the sample could bias the results if their reasons for refusing to reveal the amount borrowed could be related to a firm's financial situation and overall performance.

The contradictory predictions of theoretical studies and results of empirical analysis make it almost impossible to synthesize the literature on the implications of access to credit on the growth of firms. On the one hand, the removal of financial constraints, which have been found to impair the performance of companies and nations, should be an important growth-enhancing factor. On the other hand, regular interest, principal repayments and monitoring by banks can be an effective controlling mechanism which curbs managers' inclination to increase sales and employment above the optimal profit-maximizing level. Moreover, after a credit shock, such as the global financial crisis, output and employment can display divergent trends if the phenomena of labor hoarding and/or jobless recoveries occur. These ambiguities lead to the hypotheses that are tested in this paper.

Hypothesis 1: Getting a loan is a treatment that boosts the sales growth of firms.

Hypothesis 2: The impact of access to credit on employment is more likely to be negative, as output growth after a credit supply shock can be based on increased efficiency of existing employees or substitution of capital for labor.

According to the corollary hypothesis, the growth effects of access to credit depend on the extent to which borrowing firms face financial constraints. It is possible that financial constraints are not very severe if a company declares that access to finance is not an obstacle to current operations. In this case the impact on sales growth of getting credit is likely be weak. The negative effect on employment should also be weaker because firms which are not financially constrained are also less likely to substitute labor with assets which could be later used as collateral.

Moreover, firms which declared that their financial constraints had been removed received larger loans than firms which were granted a loan but still complained about access to finance[4]. Larger debt leaves less room for over-investment strategies because obligations to service debt disciplines managers and owners. As a result, a large loan which relaxes financial constraints can have a weaker positive effect on sales growth than a loan which does not fully satisfy the need for external financing.

4. Methodology and Data

To measure the effects of loans on firms' growth, I will rely on the treatment effects model. In this model of selectivity, the outcome variable is observed for both participants and non-participants in a particular treatment program. In this paper the dummy variable indicating the treatment condition z_i is coded 1 for firms which have had a line of credit or a loan from a financial institution in the period 2009–2012 (2009–2011 for Russian firms) and 0 otherwise. The outcome variable is the growth of sales, or alternatively, employment in the 2010 to 2012 period (2009 to 2011 for Russian firms).

The choice of time period is dictated by the focus on firms' behavior in the post-crisis period and the period over which the Business Environment and Enterprise Performance Survey (BEEPS) was conducted jointly by the World Bank and the European Bank for Reconstruction and Development, as this is the source of data used in this paper[5]. The time lag between the date of the approval of the most recent line of credit or loan and the period over which the rates of growth of sales and employment were calculated for firms in the sample ranges from 0 to 2 years. This is due to the fact that every round of BEEPS provides information on the level of sales and employment in the last two complete fiscal years. I used the survey conducted in 2013 (2012 in Russia), which made it possible to calculate the rates of growth of the outcome variables from 2010 to 2012 (2009 to 2011 for Russian firms). The list of countries and the number of firms from each country included in the sample are provided in Table A1 in the appendix.

[4] The average loan received by a company which declares that access to finance is not an obstacle to current operation is equal to 220% of its sales, while companies which remain financially constrained received on average a loan equal to 170% of their sales. It has to be stressed that these statistics are based on scant data on the size of loans, covering only about ½ of firms in the sample. As was mentioned, the surveyed companies often refused to reveal the amount of loan.

[5] The data is available at https://ebrd-beeps.com/data/.

Since the periods of performance measurement and access to credit overlap, I need to address the issue of endogeneity in general and reverse causation in particular. It could be argued that the screening process used by the banks successfully selects firms with good prospects and not the other way around; i.e. access to external financing is essential for firms to grow. The treatment effects model is well suited to dealing with the problem of the endogeneity of the dummy variable, which discriminates between firms with and without access to credit. This is because the model allows controlling for selection bias induced by non-random treatment assignment (that is, the dependence of access to credit on firms' performance).

Specifically, the treatment-effects model estimates the effect of an endogenous binary treatment, z_i, on a continuous outcome variable, y_i, observed for both z_i=1 and z_i=0. The model is composed of the regression function and the selection equation. The former is of primary interest because it measures the treatment effect, which is conditional on the independent variables x_i and the exogenous determinants of treatment assignment, w_i:

$$y_i = \beta x_i + \delta z_i + \varepsilon_i. \quad (1)$$

The selection equation models the treatment assignment decision z_i as the outcome of an unobserved latent variable z_i^*, which is assumed to be a function of the exogenous covariates w_i and the random component u_i:

$$z_i^* = \gamma w_i + u_i. \quad (2)$$

The observed assignment decision is z_i=1 if z_i^*>0 and z_i=0 otherwise.

It is assumed that the determinants of the program assignment decision are factors that also affect the outcome variable, y_i. More formally, ε_i and u_i are correlated, bivariate normal with mean zero and covariance matrix $\begin{bmatrix} \sigma^2 & \rho\sigma \\ \rho\sigma & 1 \end{bmatrix}$. The covariates x_i and w_i are unrelated to the error terms. The results of the likelihood ratio test of the null hypothesis that ρ=0 will be reported with the estimation results. The inability to reject the null hypothesis indicates that the two error terms are uncorrelated and the bias of the OLS estimate is negligible.

There are two strategies elaborated by Terza (1998) to fit this model: a two-step procedure and the maximum likelihood estimation. The latter method is more efficient and will be implemented in this paper[6]. The estimated value of δ is the average treatment effect which is the average over the entire population of the individual treatment effects. The treatment effect for individual *i* is defined as the difference between the potential outcome that would occur when *i* is treated and the potential outcome that would occur when *i* is not treated.

In the context of this paper, the binary treatment variable, labeled *credit*, is coded 1 if a firm has a loan or a line of credit and 0 otherwise[7]. The continuous outcome variable is one of the two alternative measures of a firm's performance. Sales growth

[6] The Stata 15 *etregress* command with *vce (robust)* option was used to estimate all models.

[7] The summary statistics of all variables in the treated and untreated samples can be found in Table A3 in the appendix.

is calculated as the difference between the log of sales in 2012 and 2010. The U.S. dollar values of sales are converted from domestic currencies using official exchange rates and deflated using the U.S. CPI. The employment growth rate is computed using the symmetric growth rate, as is standard in the literature on firm-level employment (Chodorow-Reich, 2014):

$$employment\ growth = \frac{employment\ in\ 2012 - employment\ in\ 2010}{0.5(employment\ in\ 2012 + employment\ in\ 2010)}. \quad (3)$$

This growth rate definition is a second-order approximation of the log difference growth rate around 0. It helps limit the influence of outliers and takes values from the range [-2,2]. The time over which the growth rates are calculated for Russian firms is lagged by one year.

The set of covariates w_i, i.e. exogenous determinants of access to credit, comprises a constant and three variables which were overwhelmingly found in the literature to relieve firms' liquidity constraints (Beck et al., 2005; Beck et al., 2006; Kuntchev et al., 2013; Coluzzi et al., 2015; Ferrando and Mulier, 2015a; Koráb and Poměnková, 2017)[8]. The first is the year when a firm was formally registered, labeled *year_registered*. I consider the registration year to be a better proxy for age than the year a company began operations because official documents have to be submitted with loan applications.

The second determinant of firm's access to credit is size, measured by the number of full-time employees when a firm started operations, labeled *empl_start*. Using the level of employment when a firm was established instead of its current level offers two advantages. First, it allows avoiding a mechanical relation with the rate of growth of employment, which is one of the dependent variables. Second, the size of a firm when it began operations can be a proxy for the probability of having credit history and a long-term relationship with a bank because it was a determinant of access to credit in the past. As was mentioned before, a long-term relationship with the lender (which cannot be captured using BEEPS data) can alleviate credit constraints faced by firms.

The percentage of land occupied by the establishment which is owned by a firm is the third variable in the selection equation. The variable land captures the availability of assets which can be put up as collateral. The majority (about 62%) of surveyed firms reported that land and buildings were the type of collateral required by lenders[9]. Ownership of assets which can be used as collateral should be positively associated with the probability of getting a loan[10].

The vector of covariates in the regression equation contains the variable of interest, *credit*, which is a binary variable z_i that indicates a line of credit or loan financing. The set of controls includes a firm's size, innovativeness and age. Hence, I used a standard specification of the growth model at the firm level in which growth is measured by proportional change in employment or sales and one of the regressors is

[8] The definitions of all variables are presented in Table A2 in the appendix.
[9] The corresponding figure for machines is 38%, personal assets of the owner – 25%, accounts receivable – 17%; 16% of firms posted other forms of collateral.
[10] Aliyev-Ada et al. (2015) show that firm-specific characteristics, such as size, age, and collateral affect also the way monetary policy influences the external financing decisions of Czech firms.

the size of the firm (Coad and Hölzl, 2012). To avoid a mechanical relation with the regressand, size is measured by the three-year-lagged level of employment and sales when the dependent variable is, respectively, the growth of sales and employment. Although according to Gibrat's Law the growth rates of firms are independent of size, the implied prediction that the empirical distribution of firms' sizes converges towards a lognormal distribution was rejected by many studies (Santarelli et al., 2006)[11].

Firms use innovations to strengthen their market position, grow (Audretsch et al., 2014) and boost their value (Rubera and Kirca, 2012). The level of R&D investment seems to be positively associated with employment growth (Capasso et al. 2015), while the impact of innovations is dependent on whether a new product or process is implemented (Harrison et al., 2014). Therefore, I include two dummies to account for different types of innovations. The first binary variable, *new_products*, takes the value of 1 if in 2011–2013 a firm introduced new or significantly improved products or services, and zero otherwise. The second indicator variable, *new_organization*, is coded 1 if a firm introduced any new or significantly improved logistics, delivery, or distribution methods for inputs, products or services.

A firm's performance can change with age due to selection, learning-by-doing, and inertia effects (Coad et al., 2013). As time passes the weakest firms are eliminated and the survivors learn about more productive production techniques; however, as firms get older, they might become less productive if they become inert and inflexible. These processes occur from the first year of a firm's functioning, whether or not it was officially registered. Therefore, the variable *year_begin* is defined as the year when an establishment began operations.

Finally, to capture unobservable specific effects varying by countries and sectors, I added country and industry dummies to the set of independent variables in the regression equation. For the sake of space, the estimated coefficients of these dummies are omitted from the tables presenting estimation results in the next section.

5. Empirical Results

In this section I report the estimation results of the model of firms' sales and employment growth in 2011–2013 (2009–2012 for Russian firms) in transition countries.

5.1 Access to Credit and Growth

In table 1 the treatment variable credit is coded 1 if a firm had a loan or a line of credit. It is clear from the bottom part of the table that the size of the firm when it began operations, the year when it was registered, and the ownership of land are significant determinants of selection for treatment, i.e. they are significant determinants of receiving a loan.

[11] In 10 emerging economies in Europe, studied by Lyócsa and Výrost (2018), the lognormal distribution was not ruled out for 9 countries.

Table 1 Credit and Firms' Growth

GROWTH MEASURE	*Sales growth*	*Employment growth*
Regression equation		
empl_lag	-0.048***	
	(0.011)	
sales_lag		-0.006**
		(0.002)
new_products	0.061**	0.036***
	(0.030)	(0.009)
new_organization	0.094***	0.033***
	(0.032)	(0.010)
year_begin	0.009***	0.003***
	(0.001)	(0.0004)
credit	1.225***	-0.324***
	(0.186)	(0.035)
constant	-18.448***	-6.735***
	(2.638)	(0.936)
Selection equation		
empl_start	0.0002***	0.0001**
	(0.00007)	(0.00005)
year_registered	-0.005***	-0.006***
	(0.001)	(0.001)
land	0.001***	0.002***
	(0.0003)	(0.0002)
constant	10.910***	11.681***
	(2.954)	(3.056)
χ^2 (p-value) of Wald test of ρ=0	23.37 (0.0)	85.64 (0.0)
Observations	7817	7899

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; country and sector dummies included.

The estimation results in the top part of Table 1 prove that access to credit significantly affects firms' performance. Sales growth is higher in firms that have a loan or a line of credit, while employment growth is negatively associated with access to finance. This diverse response of firms to receiving bank financing is consistent with the hypotheses put forward in this paper. Firms seem to use loan funds efficiently to expand production, but to that end they do not increase employment. Therefore, they increase efficiency in production and/or accumulate other collateral suitable assets such as physical capital.

Table 1 also reveals that the size of a firm slows its future growth, which contradicts Gibrat's Law. As expected, the introduction of new products or improved logistics, delivery, or distribution methods for inputs, products or services spurs sales and employment. Finally, younger firms tend to grow faster. It should be noted that the null hypothesis of no correlation between the error terms of the regression function and the selection equation is rejected.

All countries included in the sample belong to the group of transition economies but they differ in numerous observable and unobservable factors which could affect firms' performance, such as the level of corruption, democracy or institutional development. Although country dummies included in all specifications helped to control for these differences, they did not allow analysis of the regional heterogeneity of the significance and value of the estimated coefficients. The number of observations for many countries in the sample is not sufficient to fit a separate model to each country's dataset; instead, the economies that were similar in terms of the aforementioned characteristics were grouped into regions.

Table 2 Credit and Firms' Growth: Regional Differences

GROWTH MEASURE	***Sales growth***			***Employment growth***		
Region	*EU*	*SEE*	*CIS*	*EU*	*SEE*	*CIS*
Regression equation						
empl_lag	-0.070*** (0.016)		-0.052*** (0.018)			
sales_lag				-0.007* (0.004)		-0.009*** (0.003)
new_products	0.088* (0.049)				0.072*** (0.017)	
new_organization		0.122* (0.068)	0.090** (0.045)	0.040** (0.016)		0.041*** (0.014)
spending_R&D				0.040** (0.018)		
year_begin	0.007*** (0.002)	0.007*** (0.003)	0.007*** (0.001)	0.002*** (0.001)	0.003*** (0.001)	0.004*** (0.001)
private_domestic_own				-0.000* (0.000)		
private_foreign_own	0.002* (0.001)				-0.001** (0.000)	
government_own		-0.005* (0.003)				
technology_licensed			0.136** (0.059)			0.044*** (0.017)
main_city		-0.115** (0.051)				
credit	1.124*** (0.377)	1.331*** (0.297)	0.959** (0.468)	-0.272*** (0.080)	-0.293*** (0.084)	-0.295*** (0.049)
constant	-13.181*** (4.280)	-14.327*** (5.039)	-14.448*** (2.793)	-4.210*** (1.582)	-6.544*** (1.059)	-7.343*** (1.183)
Selection equation						
empl_start	0.000*** (0.000)			0.001*** (0.000)		
year_registered	-0.008*** (0.003)			-0.007*** (0.003)		-0.005** (0.002)
private_foreign_own	-0.003*** (0.001)					
auditor		0.136** (0.057)	0.430*** (0.067)			
land				0.002*** (0.001)	0.001*** (0.001)	
buildings			0.002*** (0.001)			0.003*** (0.000)
largest_owner		0.005*** (0.002)			0.005*** (0.001)	
constant	14.739*** (5.100)	-0.853*** (0.150)	-0.890*** (0.063)	14.209** (5.527)	-1.013*** (0.106)	9.677** (4.128)
χ^2 (p-value) of Wald test of ρ=0	5.402 (0.020)	10.655 (0.001)	2.754 (0.097)	11.219 (0.001)	11.723 (0.001)	42.810 (0.000)
Observations	2136	1843	4598	2169	2534	4748

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; country and sector dummies included. SEE: Southeastern Europe, CIS: Commonwealth of Independent States and Mongolia, EU: European Union.

The first region, labeled EU, was composed of the member countries of the European Union. The second region, called CIS, embraced the countries forming the Commonwealth of Independent States and Mongolia. The European countries (including Turkey) that have not joined the European Union constituted the third

region, Southeastern Europe (SEE)[12]. The estimation results of the determinants of sales and employment growth in firms from each of the three regions are shown in Table 2.

Regarding the variable of interest, i.e. regressor credit, large interregional differences in its impact on sales and employment growth were not discovered in Table A4. Only in CIS countries did the impact on sales growth of access to credit seem to be slightly weaker and less significant. Despite various regional disparities between the countries in the sample, the growth of sales accelerated and the growth of employment decelerated in firms with a bank loan, regardless of their geographical location.

By contrast, the other determinants of growth in sales and employment and access to credit differed significantly across regions. Firms' size did not affect their growth in the SEE region. The percentage of a firm owned by private foreign individuals (variable *private_foreign_own*) boosted the growth of sales and reduced access to credit in the EU region and decreased the growth of employment in SEE countries. In the latter region the percentage of a firm owned by the government (variable *government_own*) reduced the growth of sales; in the EU countries the percentage of a firm owned by private domestic individuals (variable *private_domestic_own*) was a drag on employment growth. Firms in the CIS countries that licensed technology from a foreign-owned company (variable *technology_lincensed*) experienced higher growth in employment and sales. The significance of innovation indicators varied a lot between regions while the age of a firm was uniformly negatively associated with its growth. Two region-specific factors that enhanced access to credit were found: the percentage share in the ownership of buildings occupied by a firm (variable *buildings*) in the CIS countries and the percentage of a firm owned by the largest owner (variable *largest_owner*) in the SEE region.

5.2 Robustness Checks and Extensions

The first robustness test consists in using in the regional level estimates all the variables that were found significant in Table 1. As can be seen from Table A4 in the appendix, the main results are not sensitive to the inclusion of additional covariates in the selection equation. A typical firm with a loan or a line of credit experienced higher growth of sales and lower growth of employment in all three regions. Hence, the conclusions drawn from Table 2 remain valid.

To gain deeper insights into the role of loans and the extent to which they eliminate financial constraints, I refined the definition of the treatment variable. The new binary variable *credit_noliqcon* is coded 1 if a firm has a loan or a line of credit and is not liquidity constrained; a firm falls into this category if it declared that access to finance is not an obstacle to its current operations. The result of access to credit on this basis is presented in Table 3.

As the year when a company was registered was not a significant determinant of having a loan or a line of credit, a new variable, *auditor*, was included in the selection equation. It is a dummy coded 1 if the annual financial statements of a firm

[12] See Table A1 in the appendix for the regional classification.

were checked and certified by an external auditor. I assume that an external audit improves a bank's assessment of the creditworthiness of a borrower.

Table 3 Credit and Growth of Firms Not Constrained by Liquidity Problems

GROWTH MEASURE	***Sales growth***	***Employment growth***
Regression equation		
empl_lag	-0.035*** (0.010)	
sales_lag		-0.004** (0.002)
new_products	0.056** (0.030)	0.040*** (0.009)
new_organization	0.098*** (0.031)	0.033*** (0.010)
year_begin	0.005*** (0.0009)	0.004*** (0.0004)
credit_noliqcon	-0.015 (0.062)	-0.134** (0.068)
constant	-11.032*** (1.829)	-8.754*** (0.838)
Selection equation		
empl_start		0.0009* (0.00005)
land	0.001*** (0.0003)	0.003*** (0.0004)
auditor	0.196*** (0.041)	0.168*** (0.042)
constant	-1.616*** (0.035)	-1.624*** (0.035)
χ^2 (p-value) of Wald test of ρ=0	5.50 (0.019)	7.21 (0.007)
Observations	8261	7849

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; country and sector dummies included.

Since the sign and significance of control and selection variables and the results of the diagnostic test remained unchanged, I focus on the variable of interest, i.e. *credit_noliqcon*. The estimation results shown in Table 3 shed new light on the importance of access to credit for firms' growth. They point to a negative but non-significant impact on sales growth and a negative and significant influence on employment growth. Firms with access to bank finance and sufficient funds to operate do not expand production more than companies subject to financial constraints. This finding is consistent with the second hypothesis pursued in this paper. A loan which fully satisfies the demand for external finance seems to encourage firms to adopt a more cautious approach regarding growth.

By the same token, one should presume that the growth of sales of firms still facing liquidity constraints after getting a loan is less restrained by the obligations to service debt. Therefore, the impact of a loan on sales growth should be positive. To test this prediction, I defined the new treatment variable, *credit_liqcon*, which takes a value of 1 if a firm has a loan or a line of credit but declares that access to finance constitutes a minor, moderate, major or very severe obstacle to its current operations. The estimation results are presented in Table 4.

Table 4 Credit and Growth of Liquidity Constrained Firms

GROWTH MEASURE	*Sales growth*	*Employment growth*
Regression equation		
empl_lag	-0.044***	
	(0.011)	
sales_lag		-0.005**
		(0.002)
new_products	0.062**	0.037***
	(0.030)	(0.009)
new_organization	0.096***	0.033***
	(0.033)	(0.010)
year_begin	0.008***	0.004***
	(0.001)	(0.0004)
credit_liqcon	1.229***	-0.215***
	(0.185)	(0.061)
constant	-16.747***	-7.842***
	(2.582)	(0.914)
Selection equation		
empl_start	0.002**	0.0001**
	(0.0001)	(0.00005)
year_registered	-0.005***	-0.0057***
	(0.001)	(0.0016)
land	0.0005*	0.001***
	(0.0002)	(0.0003)
constant	10.070***	10.392***
	(3.226)	(3.107)
χ^2 (p-value) of Wald test of ρ=0	22.34 (0.0)	15.34 (0.0)
Observations	8469	7899

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; country and sector dummies included.

The estimation results in Table 4 show that firms which took out a loan but still consider themselves to be liquidity constrained grow faster in terms of sales but have lower employment growth than firms without access to bank finance. It is noteworthy that the average treatment effect on employment growth in firms which complain about obstacles in access to finance is equal to -0.215, while it is equal to -0.134 in Table 3, which presents the results for companies without financial constraints. This finding suggests that the jobless recovery phenomenon occurs because firms which remain financially constrained are likely to substitute capital for labor in an attempt to build up a stock of assets that could later be pledged as collateral for future borrowings.

In the second robustness check, the models for credit-constrained and not credit-constrained firms were estimated on regional samples. The results shown in Table A5 in the appendix reveal some regional differences with respect to the impact of access to credit on firms' growth. In contrast to the results reported in Table 3, the impact of a loan on sales' growth of firms that are not constrained by liquidity problems is positive and significant in Southeastern Europe. A negative effect of credit on employment growth seems to be confined to firms from the European Union. Estimation results at the regional level for firms that have a loan but remain liquidity constrained are similar to those presented in Table 4, i.e. regional specificity was not discernible.

Overall, the estimation results show that access to credit bolsters sales growth only if the financing needs of firms are not fully covered. By contrast, the impact of receiving a loan on employment growth is negative.

6. Conclusions

The notion that finance is good for growth was illustrated by multiple examples of empirical international studies. Interestingly, the focus of firm-level analysis was usually on the implication of lack of access to bank finance. The contribution of this paper is twofold. First, two aspects of firms' performance are elucidated: sales and employment growth. Second, I analyze access to credit as an endogenous treatment whose effects are independent of the dose. Thus, this paper complements empirical studies of the consequences of liquidity constraints faced by firms.

Using data from the World Bank Business Environment and Enterprise Performance Survey on firms from Eastern Europe and Central Asia in 2010 and 2012, I obtained new insights into the growth of output and employment after the global financial crisis caused by the credit crunch. Although the group of 29 countries included in the sample is not homogenous, the main findings are not sensitive to the regional location of the firms.

Firms which have a loan or line of credit generally experience higher sales growth than their counterparts with no access to credit. This result does not hold, however, for firms which do not perceive access to finance as an obstacle. Larger loans extended to firms with no financial constraints seem to act as a disciplining device for managers and owners or simply add to otherwise abundant sources of finance. When financial constraints are eliminated, the non-significant effect on sales of having a loan accords with the non-linear relationship between credit and economic growth found at the macroeconomic level.

By contrast, access to credit hampers employment growth. The negative effect of a loan on employment in firms which remain liquidity constrained is stronger than in firms which do not complain about access to finance. This result can be attributed to the substitution of labor in production with assets which could serve as collateral in future attempts to get a loan. If liquidity constraints are lessened but not completely removed, firms can opt for production techniques which more intensively use capital and other assets suitable as collateral. This implies that labor market recovery is more sluggish than production expansion after a credit crunch.

APPENDIX

Table A1 The List of Countries and the Number of Firms With a Loan or a Line of Credit

Country	*Region*	*Number of firms (of which: firms with a loan or a line of credit)*
Albania	SEE	488 (55)
Armenia	CIS	729 (128)
Azerbaijan	CIS	766 (46)
Belarus	CIS	615 (108)
Bosnia and Herzegovina	SEE	719 (169)
Bulgaria	EU	581 (85)
Croatia	EU	518 (116)
Czech Republic	EU	499 (73)
Estonia	EU	542 (68)
Georgia	CIS	727 (111)
Hungary	EU	593 (69)
Kazakhstan	CIS	1127 (87)
Kosovo	SEE	463 (92)
Kyrgyzstan	CIS	503 (60)
Latvia	EU	605 (30)
Lithuania	EU	534 (45)
Macedonia	SEE	724 (151)
Moldova	CIS	719 (109)
Mongolia	CIS	721 (159)
Montenegro	SEE	251 (51)
Poland	EU	935 (94)
Romania	EU	1064 (151)
Russia	CIS	5135 (913)
Serbia	SEE	738 (160)
Slovakia	EU	536 (52)
Slovenia	EU	543 (108)
Tajikistan	CIS	716 (35)
Turkey	SEE	2436 (203)
Ukraine	CIS	1835 (142)
Uzbekistan	CIS	756 (91)

Notes: The actual number of observations used for estimation is smaller due to availability of data on other variables included in the model. SEE: Southeastern Europe, CIS: Commonwealth of Independent States and Mongolia, EU: European Union.

Table A2 Definitions of Variables

Name	*Definition*
Continuous variables	
sales growth	Difference between the log of sales in 2012 and 2010. The value of sales converted to USD using official exchange rates and deflated using the US CPI index
sales_lag	The log of the real value of sales in 2010
employment growth	$\frac{employment\ in\ 2012 - employment\ in\ 2010}{0.5(employment\ in\ 2012 + employment\ in\ 2010)}$
empl_lag	The log of employment in 2010
empl_start	The number of full-time employees when a firm started operations
private_domestic_own	Percentage of a firm owned by private domestic individuals, companies or organizations
private_foreign_own	Percentage of a firm owned by private foreign individuals, companies or organizations
government_own	Percentage of a firm owned by government or state
largest_owner	Percentage of a firm held by the largest owner or owners
land	Percentage of the land occupied by a firm owned by this firm
buildings	Percentage of the buildings occupied by a firm owned by this firm
Binary variables	
credit	Dummy equal to 1 if a firm has a line of credit or a loan from a financial institution
credit_liqcon	Dummy equal to 1 if a firm had a loan or a line of credit but declared that access to finance constitutes a minor, moderate, major or very severe obstacle to its

	current operations.
credit_noliqcon	Dummy equal to 1 if a firm had a loan or a line of credit and declared that access to finance is not an obstacle to its current operations
new_products	Dummy equal to 1 if during the years 2010–2012 a firm introduced new or significantly improved products or services
new_organization	Dummy equal to 1 if during the years 2010–2012 a firm introduced new or significantly improved organizational structures or management practices
spending_R&D	Dummy equal to 1 if during the years 2010–2012 a firm spent on formal research and development activities, either in-house or contracted with other companies
technology_licensed	Dummy equal to 1 if a firm used technology licensed from a foreign-owned company, excluding office software
main_city	Dummy equal to 1 if a firm is located in the main business city
auditor	Dummy equal to 1 if a company had its annual financial statements checked and certified by an external auditor
Time variables	
year_begin	The year in which a firm began operations
year_registered	The year in which a firm formally registered

Table A3 Sample Summary Statistics

Variable	***Treated***		***Treated but refused to reveal or did not know the amount borrowed***		***Non-treated***	
Continuous variables (Mean and standard deviation)						
	Mean	*Std dev*	*Mean*	*Std dev*	*Mean*	*Std dev*
sales growth	0.146	1.102	0.094	0.927	0.132	1.043
sales_lag	13.703	2.108	13.973	2.262	12.989	2.070
employment growth	0.096	0.352	0.087	0.323	0.053	0.349
empl_lag	3.215	1.324	3.672	1.400	2.863	1.216
empl_start	66.425	352.599	84.679	508.103	40.084	255.593
private_domestic_own	93.739	21.671	92.416	23.515	92.744	23.886
private_foreign_own	4.253	18.090	5.630	21.019	5.357	20.923
government_own	0.868	7.748	0.544	6.699	0.783	7.381
largest_owner	77.823	29.637	73.623	31.292	77.711	30.047
land	59.459	46.395	54.330	46.662	49.652	48.440
buildings	65.701	44.413	63.762	44.639	55.319	48.056
Binary variables (Number of 1s)						
credit_liqcon	1542		223		0	
credit_noliqcon	675		80		0	
new_products	793		115		1374	
new_organization	712		92		1178	
spending_R&D	370		41		614	
technology_licensed	365		54		748	
auditor	306		39		2473	
main_city	486		64		1181	
Time variables (Median)						
year_begin	1998		1997		1999	
year_registered	1998		1999		2000	
No. of observations	2226		305		5604	

Notes: The treatment variable used to split the sample into treated and non-treated firms was *credit* (coded 1 if a firm has a loan or a line of credit and 0 otherwise) for all variables in the table with the exception of *land* and *auditor* for which the treatment variable *credit_noliqcon* (coded 1 if a firm has a loan or a line of credit and is not liquidity constrained) was used. In the latter case the number of treated and non-treated firms equals 675 and 7174, respectively.

Table A4 Robustness Check: Regional Differences in the Impact of Access to Credit on Firms' Growth

GROWTH MEASURE	***Sales growth***			***Employment growth***		
Region	*EU*	*SEE*	*CIS*	*EU*	*SEE*	*CIS*
			Regression equation			
empl_lag	-0.074***	-0.021	-0.053***			
	(0.017)	(0.020)	(0.018)			
sales_lag				-0.007*	0.001	-0.012***
				(0.004)	(0.004)	(0.004)
new_products	0.073	0.009	0.033	0.017	0.089***	0.023
	(0.054)	(0.063)	(0.040)	(0.015)	(0.020)	(0.015)
new_organization	0.043	0.128*	0.079*	0.044***	-0.004	0.039**
	(0.050)	(0.067)	(0.047)	(0.016)	(0.022)	(0.016)
year_begin	0.006***	0.007***	0.009***	0.002***	0.003***	0.005***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
private_foreign_own	0.002*			0.001*	-0.001*	
	(0.001)			(0.000)	(0.000)	
government_own		-0.005*				
		(0.003)				
technology_licensed			0.129**			0.042**
			(0.059)			(0.018)
main_city		-0.111**				
		(0.051)				
credit	1.110***	1.333***	0.965*	-0.263***	-0.331***	-0.320***
	(0.396)	(0.297)	(0.493)	(0.085)	(0.063)	(0.050)
constant	-13.029***	-13.360***	-16.980***	-4.160***	-6.434***	-8.935***
	(4.360)	(4.987)	(3.065)	(1.591)	(1.649)	(1.527)
			Selection equation			
empl_start	0.000***	0.000	0.000	0.001***	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
year_registered	-0.007***	0.000	-0.002	-0.008***	-0.004	-0.005*
	(0.003)	(0.000)	(0.002)	(0.003)	(0.003)	(0.003)
private_foreign_own	-0.003***					
	(0.001)					
auditor		0.137**	0.408***			
		(0.059)	(0.076)			
land	0.001	0.000	0.001	0.002***	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
buildings			0.001*			0.003***
			(0.001)			(0.001)
largest_owner		0.005***			0.006***	
		(0.002)			(0.001)	
constant	13.680***	-0.998**	3.845	14.446***	7.368	8.746*
	(5.026)	(0.476)	(4.788)	(5.508)	(5.656)	(5.140)
χ^2 (p-value) of Wald test of ρ=0	4.825	10.621	2.544	9.547	28.321	45.024
	(0.028)	(0.001)	(0.111)	(0.002)	(0.000)	(0.000)
Observations	2133	1843	4069	2169	1756	3945

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; country and sector dummies included. SEE: Southeastern Europe, CIS: Commonwealth of Independent States and Mongolia, EU: European Union.

Table A5 Regional Differences in the Impact of Access to Credit on Growth of Firms Not Constrained and Constrained by Liquidity Problems

GROWTH MEASURE	***Sales growth***			***Employment growth***		
Region	*EU*	*SEE*	*CIS*	*EU*	*SEE*	*CIS*
			firms not constrained by liquidity problems			
credit_noliqcon	0.071	1.532***	-0.132	-0.128**	0.054	-0.129
	(0.119)	(0.243)	(0.080)	(0.058)	(0.056)	(0.099)
			liquidity constrained firms			
credit_liqcon	1.289***	1.334***	1.074***	-0.156**	-0.231***	-0.238***
	(0.220)	(0.287)	(0.267)	(0.079)	(0.083)	(0.076)

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. SEE: Southeastern Europe, CIS: Commonwealth of Independent States and Mongolia, EU: European Union. The model specification for each region included only significant variables in the regression and selection equations. The table reports the value of the coefficients of *credit_noliqcon* and *credit_liqcon*.

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