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DETERMINANTS OF FIRM-LEVEL GROWTH: LESSONS FROM THE CZECH REPUBLIC, HUNGARY, AND POLAND

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Abstract

This paper examines the determinants of firm-level growth based on three eastern European countries – the Czech Republic, Hungary, and Poland. We investigate whether there exist common firm-level characteristics that play a significant role in determining firm-level performance across the three countries, and whether development in financial markets can facilitate the growth of individual firms, particularly for firms that require external financing (borrowing). Our empirical analysis shows that in the case of Poland, firm-level characteristics, such as firm age and firm size, turn out to be significant, and that the role of these factors on the sales growth of firms is quite consistent with the findings in the existing literature. The same firm-level characteristics do not appear to be significant in the cases of Czechia and Hungary, which suggests that these factors play a different role in the firm-level growth of these countries. However, a firm's access to external financing matters for the determining the firm's growth and its development of financial markets, which enables the firm to have easier access to external sources of financing, thereby especially facilitating the growth of the individual firm that might need external funds. Our findings provide additional empirical evidence on the existing literature that emphasizes the positive impact of financial development on the individual firms' growth based on a cross-country analysis.

Keywords: *Firm-level growth, Dependence on external finance, Financial development*

JEL Classification: *D22, G30, G1*

1. Introduction

Understanding the factors that can explain the growth of individual firms has been considered an important topic in economics, at it is closely related to a country's economic growth and fluctuations (Gabaix 2011; Giovanni et al. 2014; Stella 2015; Anthonisen 2016; Carvalho and Grassi 2019). Given its importance, there have been studies that examine the determinants of firm-level growth or performance regarding Central Eastern European countries. For example, Burger et al. (2017) shows that there exist

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country-specific factors to explain the performance of firms in central European countries, while Baumöhl et al. (2019) also investigates the performance of firms measured as the firm survival, and examines the role of institutional quality. There are also studies that examine the issue for Central Eastern European countries, such as Peric et al. (2020), which studies the law of proportionate effect for Slovenia, and Srhoj et al. (2018), which documents the characteristics of high-growth firms in Slovenia. Though this literature provides important implications for a country or Central Eastern European countries, it still lacks empirical research on the determinants of firm-level growth for cross-country comparisons in the region. To fill this gap, we seek in this paper to investigate the determinants of firm-level growth based on three countries in Europe – the Czech Republic, Hungary, and Poland – and examine whether there are common factors that can explain the performance of firms in these countries, since cross-country comparisons help identify the common and country-specific factors that play important roles in determining the growth of firms for each country, and help policymakers design proper policies.

To investigate the factors for firm-level growth for countries in Central Eastern Europe, we consider factors that are found to be significant in the existing studies. The existing literature attempted to unveil factors that are closely related to the performance of firms; however, there is no consensus about which factors are responsible for the growth of firms. For example, Variyam and Kraybill (1992) and Distante et al. (2018) find that firm size and age are negatively correlated with firm growth, while Samuels (1965) documents that in contrast, large firms tend to grow faster. This implies that firm size and age might not play the same role across countries or economies, and suggests that the roles of these factors should be reexamined. Along with firm-level characteristics, such as size and age, existing research also finds that financial constraints could play a significant role in determining the performance of firms. Specifically, it suggests that a firm's need to borrow, or how easily a firm can borrow (finance) from financial institutions when necessary, may be important in deciding a firm's performance. For example, Kim and Robert (2010) emphasize the financial factors that matter when predicting firm growth, and show that the relationship between firm growth and firm leverage is positive. Beck et al. (2005) also documents that financial problems are a significant factor affecting the growth rate of firms, and that the effect of financial problems on a firm's growth rates varies, depending on the firm size. Quader (2017) investigates whether access to external financing has a significant effect on the growth of firms, and finds that if financial constraints are alleviated, firms can expand. Based on the literature, we investigate whether a firm's size, age, and financial constraints play significant roles in determining the firm's performance.

For our empirical analysis, we use data from the World Bank, and attempt to examine the determinants of firm-level performance based on three countries in Central and Eastern European countries –The Czech Republic, Hungary, and Poland – for 2009 and 2013.

The empirical analysis based on these three countries suggests that firm-level characteristics turn out to be significant only in Poland, and that the impact of these factors on the performance of firms is consistent with the findings of the existing literature; for example, young and small firms are more likely to grow faster than old and large firms. However, for the other two countries, firm age and size do not appear to significantly affect the firm's sales growth, which implies that firm-level factors may play different roles, depending on the country. The empirical results also show that firms' access to external financing, which is measured as the amount of loans and the history of loans, may be significant factors in the determination of the growth of firms in these three countries.

Our contribution to the existing literature is that we provide additional empirical evidence on the determinant of firm-level growth for Central Eastern European countries. There have been studies on Central Eastern European countries that examine the determinants of firm growth, such as Srhoj et al. (2018) and Zajc and Ponikvar (2011); however, there have not been many studies that compare the determinants of the factors that are responsible for the growth of firms for Central Eastern European countries based on firm-level analysis. In addition, our empirical analysis based on three Central Eastern European countries helps distinguish factors that are common in these countries. Our results suggest that the countries in our sample have common factors that can explain the performance of firms, which are financial constraints, and access to external financing. The findings in this paper imply that a country can promote the growth of firms by ensuring that the firms that need external sources of funding are able to readily borrow from financial markets. Policies that supply credit to banks or financial institutions, which would ultimately result in increased lending to firms, may also have the same impact. Our paper also adds additional empirical evidence to the existing literature that stresses the positive impact of credit supply to firms that are in need of

external financing based on the cross-country analysis, though it lacks some balance sheet information and time periods to analyze.

The rest of this paper is organized as follows: Section 2 reviews the enterprise data used for empirical analysis, while Section 3 presents the empirical methods and estimation results. Section 4 then concludes the paper.

2. Data

We start with a description of the data that we used for the empirical analysis. The firm-level data is from the World Bank's Enterprise Surveys. The survey collects a broad range of information on each firm, such as the characteristics of the top managers and the business environment (crime, corruption, infrastructure, etc.), though it lacks information on the balance sheet data. The survey compares years 2009 and 2013, which years postdate the global financial crisis, and we use the data from both of those survey years.

The question we are interested in is whether firm-specific factors, such as size, investment, or access to external credit, play significant roles in the performance of firms across countries. However, the data does not contain information on the number of creditors, or other information on balance sheet. To overcome the lack of information on the balance sheet, we construct the variables with the availability of the given data. We also define the firm size based on four categories, though firm size is generally measured by asset size or the number of employees, as the Enterprise Surveys do not contain information on either of these. Thereafter, as an alternative, we use information based on sampling size, which classifies firms into four categories based on their numbers of employees. Table 1 shows the number of firms for each firm size category: micro size includes firms with less than 5 employees, small firms have more than 5 employees but less than 19 employees, medium firms are firms that have more than 20 employees but less than 99 employees, and large size firms are firms that have more than 100 employees. This shows that the Czech Republic and Poland generally lacked micro-sized firms compared to Hungary, while Hungary seems to have an even distribution of micro to large firms.

Table 2 summarizes how the firm was originally established based on the question, how was the firm established. Most firms in the sample started as private firms, and we can observe this pattern among countries in the sample. The list of firms regarding their

Table 1. The Number of Firms by Size.

Sampling size	Whole Sample	Czech Republic	Hungary	Poland	Total
Micro (1 to 5)	232	5	194	33	232
Small (5 to 19)	832	230	167	435	832
Medium (20 to 99)	632	156	148	328	632
Large (100+)	406	113	92	201	406
Total	2,102	504	601	997	2,102

Table 2. Classification by Establishment.

Establishment	Whole	Czechia	Hungary	Poland
No answer	2	1	1	0
Refused	2	0	0	2
Privatization of a state-owned firms	233	46	71	116
Originally private from time of start	1,748	434	486	828
Private subsidiary of a formerly state-owned firm	39	7	8	24
Joint venture with foreign partner(s)	41	10	24	7
State-owned firm	17	1	7	9
Other Spontaneous	20	5	4	11

establishment suggests that we can classify firms into government/state-owned firms, based on their establishment. It seems to be obvious to consider firms that are established as state-owned firms as government/state-owned firms. In addition, government/state-owned firms can also be defined that are established through the privatization of a state-owned firm, and the private subsidiary of a formerly state-owned firm.

While we can identify firms as government/state-owned firms, it helps researchers to distinguish foreign firms/subsidiaries that might be crucial in determining the performance of firms. We use the information that shows the share of private foreign individuals, and define firms as foreign owned if their shares exceed 50%. Given the definition, out of the 2,102 firms, 209 firms turn out to be foreign-owned.

Next, we examine firms' access to external financing using their answers on the value of credit, mainly the internal funds. We use the answers on the value of the most recent lines of credit/loan at the time of approval as a measure of the amount of loans that have been borrowed by a firm. Additionally, we use the information on the shares of internal funds/retained earnings out of fixed assets, and define the variable that then reflects a firm's need for external borrowing. Our conjecture is that firms are less likely to borrow money from financial institutions, as the share of internal funds within the share of fixed assets rises, rather than firms for which the share of internal funds relative to fixed assets is low. As an alternative measure, we also use the answers from the question: a line of credit, or a loan from a financial institution. A firm might answer this question based on their credit history with financial institutions, or it might reject answering this question overall. We define a firm has (had) access to external financing if the answer to the question is "Yes," otherwise we consider that the firm has (had) no access to external borrowing. This approach helps overcome the lack of information on the general balance sheet, and enables the role of credit supplied to a firm to be examined in the determination of its performance across different measures of access to external financing.

Table 4 shows the summary statistics for firm age, the sales growth of a firm, external fund share, history of loan, and the number of loans for each country. We limit our attention to firms where sales growth is less than 300%, to exclude outliers in the data.[1]

The basic statistics on firm size, age, sales growth, and the ownership structure of firms suggest that these three countries do not exhibit significant heterogeneity (or differences). Given the data described in this section, the next section present how we analyze the performance of firms in these countries, and shows some findings based on empirical analysis.

Table 3. Definition of Variables.

Category	Variable	Definition
Dependent variable	Sales growth	$Sales\ growth_{i,t-1} = \frac{Sales_{i,t-1} - Sales_{i,t-3}}{Sales_{i,t-3}}/2$
Independent variable	Government owned firm	A dummy variable for firms that are government or state-owned firms.
	Foreign firm	A dummy variable for firms where the share of private foreign individuals is more than 50%.
	Firm age	The difference between the current year and the year of operation.
	Development in financial market	i) The difference of domestic credit to the private sector between 2007 and 2004. ii) The difference of domestic credit to the private sector between 2011 and 2008.

3. Empirical Results

In this section, we explore the determinants of firm performance given the data described in the previous section. As far as is possible, over the course of the analysis we analyze the firm performance in consistent manner to the existing literature, including variables, such as firm age and size. The purpose of the empirical analysis is to unveil factors that are closely related to the performance of firms. We consider the firms' access to credit as one of the factors that can explain the outcome of firms, as well as firm-level characteristics once controlling other firm-level variables, such as age and firm size, given the availability of the data.

Our main hypothesis is that firms in these countries would grow faster when they have enough cash flows or internal funds to finance investment, than when they finance investment through external sources, such as through private banks, non-banks. We first need to define the variable that can measure the performance of firms in the data to accurately evaluate a firm's performance. We use the average sales growth rate between years t−1 and t−3 based on the survey question, which documents the total annual sales from the last fiscal year, and the total annual sales from 3 years ago, and we calculate the annual sales growth through the following equation:

$$Sales\ growth_{i,t-1} = \frac{Sales_{i,t-1} - Sales_{i,t-3}}{Sales_{i,t-3}}/2 \quad (1)$$

where $Sales\ growth_{i,t-1}$ is the annual sales growth of a firm's measures of performance. We exclude firms with more than 300 percent annual sales growth to control for outliers. As a base-line empirical analysis, we investigate factors that might play significant roles in determining a firm's sales growth. We consider firm-specific factors, such as ownership structure, firm size, and age (Mertzanis, 2017), along with its access to external financing. For ownership, we use the shares of private domestic individuals, a private dummy for foreign individuals, and the shares owned by the government or state. The firm age is calculated based on the information on the establishment date of the firm. The database provides information on firm size based on their sorting into four categories, which consist of micro, small, medium. and large firms, based on the number of employees a firm has. Lastly, we need to define a firm's access to external financing. We use the information on the value of the most recent line of credit or existing loan at the time of approval. This

Table 4. Summary Statistics

Czechia					
Variable	Obs	Mean	Std. Dev.	Min	Max
Firm Age	441	16.1179	8.6621	0	86
Sales Growth	458	21.2905	90.4164	−125	850
External Fund Shares	285	36.7684	38.6162	0	100
History of Loans	458	0.5044	0.5005	0	1
Number of Loans	458	5.3766	7.3898	0	22.8923
Hungary					
Variable	Obs	Mean	Std. Dev.	Min	Max
Firm Age	518	15.5309	7.9914	1	68
Sales Growth	525	14.582	62.2908	−50	642.494
External Fund Shares	207	31.3478	39.3157	0	100
History of Loans	525	0.4248	0.4948	0	1
Number of Loans	525	5.4061	8.0629	0	24.2786
Poland					
Variable	Obs	Mean	Std. Dev.	Min	Max
Firm Age	855	19.8947	14.7116	1	162
Sales Growth	875	16.084	81.5318	−50.045	825
External Fund Shares	347	34.5965	37.3717	0	100
History of Loans	875	0.3749	0.4844	0	1
Number of Loans	875	2.3255	4.9318	0	19.1138

provides essential information on the level of loans or credit a firm has recently obtained. Based on the constructed data, we estimate the following regression equation:

$$Sales\ growth_{i,t-1} = Constant + \alpha Age_{i,t-1} + \sum_{i=1}^{3} \beta_i\ Size_{i,t-1} + \sum_{i=1}^{2} \gamma_i\ Share_{i,t} + \sigma Loan_{i,t-1} + \epsilon \quad (2)$$

where, $Sales\ growth_{i,t-1}$ is the sales growth of a firm from the last year, which is calculated based on Eq. (1). $Age_{i,t-1}$ is the firm age, $Size_{i,t-1}$ is the dummy variable for each firm size category, and $Share_{i,t-1}$ is the dummy variable for foreign-owned and government-owned firms, respectively. Lastly, $Loan_{i,t-1}$ denotes the financial condition of a firm as measured by the number of loans it has obtained from financial institutions, whether it has (had) borrowed from bank and other financial institutions, and the share of external funds, which is defined based on the share of internal funds within the fixed assets of a firm.

We begin the empirical analysis by investigating the relationship between the growth rate of a firm as measured by sales growth, and its access to external financing as shown by Eq. (2) for each country, and compare the results to see whether the firm-level characteristics play different roles across countries, and whether there are country-specific factors that are crucial in determining the growth of individual firms. We discuss empirical results based on firm-level characteristics, such as the firm's age, size, and ownership structure, and compare the results across countries.

Table 5 shows the baseline results. Particularly noteworthy is the fact that a firm's age and size have different implication on sales growth for the three countries in the analysis. For example, young firms in Poland are likely to grow faster similar to the existing literature (Navaretti et al. 2014), as the coefficient on firm age appears to be negative and statistically significant (see columns (5) and (6)), implying that as firms age, the sales growth of firms would decline. However, for the other two countries, it is hard to find significant relationship between a firm's growth and its age, as the coefficients on firm age turn out to be statistically insignificant from columns (1) to (4); this fact suggests that firm age could have asymmetric effects on growth. For firm size, we can also observe different patterns across countries. It is well documented in the literature that small and young firms grow faster than other firms (Lee 2009; Bentzen et al. 2012); however, our empirical analysis presents a different relationship between firm size and its performance during the sample period. It is hard to find a significant relationship between firm size and its sales growth in Czechia, as shown in the values from columns (1) and (2), as the coefficients of the size dummy variables are statistically insignificant, and do not exhibit consistent patterns. If large firms tended to grow slower, the coefficients on the firm size dummy variables would decrease; but the coefficients on firm size dummy variables do not present this pattern, nor are they statistically significant. In contrast to these two countries, in Poland, firm size is a significant determinant of sales growth. We now examine whether ownership matters in the determination of the performance of firms. In Czechia and Poland, the ownership structure that is the share of domestic, foreign individuals, and government appears to be insignificant to determine the growth of a firm. Different from these countries, in Hungary, government-owned firms show lower growth performance, compared to private firms. Similar to firm size and age, the data does not exhibit a consistent relationship between the sales growth of firms and the ownership structure. The role of firm-level characteristics on the sales growth of firms in the baseline results holds even with different empirical specifications, as shown in Tables 6 and 7. The baseline empirical results suggest that firm-level characteristics, such as a firm's age, size, and ownership structure, may have different implications on the growth of the firm, though the results should be further investigated with more detailed firm-level data.

We now examine the role of access to external financing on the growth of firms. We first use the number of loans as a measure of access to external financing, meaning that the larger number of loans that a firm can obtain represents greater access to banks and other financial institutions. What seems to be interesting when comparing other firm-level characteristics is that across all three countries, the access to external financing appears to be significant. The coefficients on $Loan_{i,t-1}$ are positive, and they are also significant in the first, third, and fifth column; this means that firms with large numbers of loans are more likely to grow faster than firms without such a large number. We reaffirm this finding using a different measure of firm's access to external financing, as the number of loans a firm has obtained might not be a perfect measure for a firm's access to external financing, as for example, a firm can borrow/obtain funds that are not in the form of a loan. To reflect the issue, we use the information on the history of loans (k8) to construct an alternative measure. The survey asks a question on whether a firm has obtained a line of credit or a loan from a financial institution, and we classify firms who answered, "Yes," into a group that has a history of loans; otherwise,

Table 5. Determinants of Firm Growth: Baseline Empirical Results

	Czechia Republic		Hungary		Poland	
	(1)	(2)	(3)	(4)	(5)	(6)
Firm Age	−0.0029 (0.0049)	−0.0043 (0.0049)	−0.0023 (0.0060)	−0.0039 (0.0060)	−0.0120*** (0.0044)	−0.0117*** (0.0044)
Dummy for Small	−25.4402 (20.2103)	−26.2697 (20.3042)	4.9902 (3.7482)	5.3725 (3.7665)	−18.2066** (7.6818)	−19.3850** (7.6737)
Dummy for Medium	−23.7737 (20.3083)	−24.9447 (20.4186)	10.1507*** (3.9000)	10.5889*** (3.9099)	−20.9802*** (7.7819)	−22.2667*** (7.7797)
Dummy for Large	−30.6298 (20.4571)	−31.4685 (20.5784)	9.4269* (4.8679)	10.9311** (4.8189)	−22.3806*** (8.1608)	−24.3870*** (8.1680)
Dummy for Foreign	6.046 (6.0784)	5.6001 (6.1019)	−2.1171 (4.6617)	−2.4726 (4.6771)	3.6287 (5.7457)	3.7763 (5.7444)
Dummy for Government	−0.1654 (6.3953)	0.9245 (6.4071)	−8.6021** (4.1198)	−7.8207* (4.1154)	3.6157 (4.0981)	3.2757 (4.0965)
log(Amount of Loan)	0.7368*** (0.2699)		0.4476** (0.1789)		1.1387*** (0.2719)	
History of Loan		7.6751* (3.9622)		4.7381* (2.8720)		11.8918*** (2.8019)
R^2	0.0517	0.0432	0.0688	0.062	0.0819	0.0824
N	446	446	518	518	860	860

Note: The numbers in the parentheses are standard errors.
***, **, and * indicate significance at the (1, 5, and 10) % levels, respectively.

firms are classified into the group of firms without a history of loans. The history of loans is defined as a dummy variable, which has the value 1 if a firm has a credit history, but is otherwise assigned value 0. Based on the results in columns (1), (3), and (5), the coefficients on the history of loans would be positive if the access to external credit contributes to the growth of firms; otherwise, it would turn out to be a negative value. The access to external financing might contribute to an increase in the sales growth of a firm, as the coefficients on the amount of loans and the history of loans appear to be significant and positive across all sample countries, as shown in columns (2), (4) and (6). The results imply that firms would experience rapid growth, as firms are better able to borrow money from banks and other financial institutions. The results suggest that firms can benefit from an increase in the number of loans they can borrow from banks and other financial institutions. Based on the findings in Table 5, we now investigate the effect of development in financial resources devoted to private sector firms' growth.

We now consider the development in financial markets as measured by the ratio of domestic credit to the private sector relative to GDP, which is taken from World Bank development indicators. This attempts to consider whether the development of the domestic credit market or changes in the credit supply within a country might contribute to firms' growth. Specifically, we investigate whether any increase in private credit might exert a positive effect on firms that borrow money from banks. As the performance of a firm is measured by the average sales growth of the past 3 years, we define the development in financial markets as the difference between the ratio private credit to GDP at times $t-1$ and $t-3$. The survey is based on data from 2009 and 2013, thus the development in financial markets for each country for each survey year can be defined as follow:

$$FD_{i,2009} = Private\ Credit\ to\ GDP_{i,2008} - Private\ Credit\ to\ GDP_{i,2005}$$

$$FD_{i,2013} = Private\ Credit\ to\ GDP_{i,2012} - Private\ Credit\ to\ GDP_{i,2009}$$

where, $FD_{i,t}$ is the development in financial markets for a country i in year t, and $Private\ Credit\ to\ GDP_{i,t}$ is the ratio of private credit to GDP. Given the definition of the financial development indicator, we now define new variables, which are (i) the interaction term between the amount of loans and the financial development indicator, and (ii) the interaction term between the history of loans and the financial development indicator. The estimation equation now becomes the following:

$$Sales\ growth_{i,t-1} = Constant + \alpha Age_{i,t-1} + \sum_{i=1}^{3} \beta_i\, Size_{i,t-1} + \sum_{i=1}^{2} \gamma_i\, Share_{i,t} + \sigma Loan_{i,t-1} + \eta Loan_{i,t-1} \times FD_{i,t-1} + \epsilon_{i,t-1} \quad (3)$$

The coefficient on the interaction term $Loan_{i,t-1}$ x $FD_{i,t-1}$ would be positive if the increase in credit supply helps firms perform better than the firms that do not obtain loans from financial institutions.

Table 6 shows the results based on Eq. (3). The number of loans that a firm obtained from banks has different impact on the sales growth of firms in Czechia; however, this negative effect is mitigated by the overall credit supply of a country. Similar to the number of loans, the coefficient on the history of loans becomes negative, though insignificant compared to the previous results. Nevertheless, the interaction term between the history of loans and financial development turns out to be significantly positive, as shown in the second column. The results can also be interpreted as any development in the private credit supply benefits firms that reply on external borrowing, as the coefficients on $Loan_{i,t-1}$ x $FD_{i,t-1}$ and $History\ of\ Loan_{i,t-1}$ x $FD_{i,t-1}$ are positive. For Hungary and Poland, the results are consistent with the previous empirical results in Table 5. The amount of loans and the history of loans seem to have a positive impact on the sales growth of firms in both countries, regardless of empirical specification, as the coefficients on both variables appear to be positive and statistically significant. Similar to Czechia, financial development also helps firms that are dependent on external sources of financing. The results suggest that the increase in credit supply would have a positive impact on the sales growth of firms, regardless of countries where firms operate, given the sample country and period at least.

The empirical results presented in Tables 5 and 6 support our hypothesis that financial development may promote the growth of firms, as it enables firms to easily access external funds to finance investment for its operation. The firm-level characteristics, including the firm's age, size, and ownership structure, exhibit heterogeneous patterns across countries; for example, small firms do not necessarily grow faster, except for Poland. Yet, the findings show that increases in the credit supply help firms grow faster, especially firms that are dependent on external sources of financing. Up until now, the empirical analysis uses the number of loans and the history of loans as a measure of a firm's access to external financing. This approach enables firms to be differentiated by whether they borrow funds from banks, or from financial institutions. However, it does not exactly reveal how much firms are dependent on external sources of financing. For example, the history of loans is denoted as 1, regardless of how much money firms borrow from banks or financial institutions. We construct the measure of how much they are dependent on external financing based on the question that asks firms how they financed their fixed assets to resolve issues. The data provides information on the share of internal funds or retained earnings to purchase fixed assets, and we define the external fund shares, which represent how much firms borrow to purchase fixed assets, as 100 percent, minus the percent of internal funds or retained earnings to buy fixed assets. As the share is higher, this indicates that firms are more likely to rely on external funds, rather than internal funds, and that an increase in credit supply in the market might benefit those firms.

We now use new measures of access to external financing, rather than the number of loans or the history of loans as a final robustness check. We estimate Eq. (3) based on the external fund share instead of the number of loans, and Table 7 presents the results. The coefficients on external fund shares should be positive if it helps firms grow faster, and the interaction term between external fund shares and the financial development indicator, which is $External\ Fund\ Share_{i,t-1}$ x $FD_{i,t-1}$, would be positive once firms that reply on external funds to finance their fixed assets benefit from any increase in credit supply or development in financial markets in the country.

When it comes to interpreting the results in Table 7, it is somehow puzzling that the coefficients on the external fund shares are neither significant, nor do they have a consistent sign that is different from previous results. One way to reconcile the results in Table 7 with the results in Tables 5 and 6 is to recall the definitions that are used for the estimation. Different from the previous estimation, Table 7 uses the external fund share as a dependent variable that leads to different results. Previously, the results suggest that a firm can have higher growth as it has (had) access to

external financing, or as it could borrow more money from financial institutions. In contrast, the results in Table 7 denote that a firm with higher borrowing or fewer internal sources of funding might grow more slowly, though this might not hold across all specifications. It is worth noting that the negative effect of higher external fund shares on a firm's growth can be mitigated, as a firm can access loans as shown in columns (1), (3) and (5), though the coefficients on *External Fund Share* x *History of Loan* are not statistically significant in Hungary. The results also suggest that firms in need of external sources of financing can also grow more quickly with the development of financial markets in a country. Firms that lack internal funds can benefit from an increase in credit supply in the private sector, as the coefficients on the interaction term appear to be significantly positive in columns (2), (4), and (6). This bolsters our earlier empirical evidence that shows that a credit supply helps firms that depend on external financing to grow faster.

Similar to the previous empirical results, Table 7 shows that firm-level characteristics somehow play a different role, depending on where the firm is located. For example, in Poland, young and small firms would grow more quickly than old and large firms, which is consistent with the findings in the existing literature. However, in both Czechia and Hungary, it is quite hard to find empirical evidence that shows that firm age and size play significant roles. The empirical results in Tables 6 and 7 might imply that medium-sized or medium-sized and large firms might grow faster in Hungary, which differs from Poland. Of course, these results should also be investigated using more detailed firm-level data.

The empirical analysis in this section shows the significant factors that are related to the performance of firms based on three Eastern European countries. First, for Czechia and Hungary, firm-level factors, such as age and size, do not appear to be significant factors in determining the performance of firms in both

Table 6. Determinants of Firm Growth: The Effect of Increases in Credit Supply

	Czech Republic		Hungary		Poland	
	(1)	(2)	(3)	(4)	(5)	(6)
Firm Age	−0.0029 (0.0049)	−0.0042 (0.0049)	−0.0022 (0.0060)	−0.003 (0.0060)	−0.0119*** (0.0044)	−0.0115*** (0.0044)
Dummy for Small	−22.158 (19.9725)	−24.253 (20.1283)	4.0909 (3.7537)	4.0428 (3.8139)	−16.1208** (7.6824)	−17.9894** (7.6972)
Dummy for Medium	−21.9049 (20.0537)	−24.477 (20.2306)	8.5286** (3.9497)	8.8916** (3.9901)	−19.3760** (7.7678)	−21.2304*** (7.7868)
Dummy for Large	−30.1828 (20.1936)	−31.8228 (20.3887)	5.6739 (5.1254)	7.0927 (5.1766)	−20.9079** (8.1412)	−23.3654*** (8.1731)
Dummy for Foreign	5.4898 (6.0021)	4.7038 (6.0532)	−1.2613 (4.6576)	−1.5188 (4.6874)	3.6748 (5.7205)	3.981 (5.7365)
Dummy for Government	0.2199 (6.3138)	1.8294 (6.3553)	−8.4265** (4.1033)	−7.9458* (4.1033)	3.5321 (4.0802)	3.1883 (4.0904)
log(Amount of Loan)	−0.9448* (0.5580)		0.0401 (0.2539)		0.2511 (0.4104)	
log(Amount of Loan) X FD	0.1906*** (0.0556)		0.0488** (0.0217)		0.3517*** (0.1223)	
History of Loan		−11.4127 (7.5808)		0.4249 (3.5905)		7.0938* (3.7761)
History of Loan X FD		2.1552*** (0.7323)		0.6282** (0.3155)		2.0697* (1.0940)
R^2	0.0783	0.0631	0.0785	0.0697	0.091	0.0864
N	446	446	518	518	860	860

Note: The numbers in the parentheses are standard errors.
***, **, and * indicate significance at the (1, 5, and 10) % levels, respectively.

Table 7. Robustness Check: Determinants of Firm Growth

	Czech Republic		Hungary		Poland	
	(1)	(2)	(3)	(4)	(5)	(6)
Firm Age	−0.0042 (0.0049)	−0.0024 (0.0049)	−0.0039 (0.0060)	−0.0039 (0.0060)	−0.0130*** (0.0045)	−0.0130*** (0.0045)
Dummy for Small	−23.851 (20.3186)	−22.8729 (20.0979)	6.7418* (3.7525)	6.6796* (3.7481)	−19.2261** (7.7426)	−17.8250** (7.7701)
Dummy for Medium	−22.3545 (20.4099)	−22.6231 (20.1848)	11.6730*** (3.9185)	11.2586*** (3.9303)	−21.5097*** (7.8500)	−20.6183*** (7.8621)
Dummy for Large	−29.0369 (20.5401)	−28.324 (20.3255)	12.5549*** (4.8446)	11.1546** (4.9915)	−23.4661*** (8.2590)	−22.1030*** (8.2799)
Dummy for Foreign	5.5619 (6.0969)	4.39 (6.0299)	−3.0245 (4.6787)	−2.4908 (4.6956)	3.7664 (5.8048)	2.8792 (5.7947)
Dummy for Government	0.2046 (6.4371)	−0.2135 (6.3709)	−6.9877* (4.1808)	−7.0550* (4.1234)	3.1111 (4.1368)	3.6654 (4.1313)
External Fund Share	−0.049 (0.0825)	−0.2719** (0.1102)	−0.0724 (0.0917)	−0.0910* (0.0540)	−0.0183 (0.0555)	−0.0145 (0.0498)
External Fund Share X History of Loan	0.1657* (0.0923)		0.0237 (0.0994)		0.1165* (0.0683)	
External Fund Share X FD		0.0384*** (0.0111)		0.006 (0.0053)		0.0353** (0.0170)
R^2	0.0459	0.0659	0.0598	0.0623	0.0672	0.0688
N	446	446	518	518	860	860

Note: The numbers in the parentheses are standard errors.
***, **, and * indicate significance at the (1, 5, and 10) % levels, respectively.

countries, which differs from Poland. In addition to these firm-level characteristics, the analysis also shows that firms' access to external financing matters in determining these firms' growth. Granting loans to firms or access to external funds through financial institutions helps firms grow faster, and increases the development in domestic financial markets, which increases the accessibility of funds for firms, thereby contributing to the sales growth of firms. Access to external financing and previous experience on access to external financing through financial institutions play significant roles, which suggests that the availability of borrowing funds from financial institutions might help firms grow more quickly in these three countries, though other firm-level factors do not have the same impact on the growth of firms. In addition, it also shows that the high share of external financing might prevent firms from performing better than firms that have enough retained earnings. The negative impact on high external fund shares on the performance of firms can be mitigated through the development of domestic financial markets. This re-affirms the previous findings, which show that firms borrowing from banks or financial institutions benefit from an overall increase in the credit supply; it also implies that any development in financial markets that allows firms to easily access credit would promote firms that are dependent on external financing. In contrast, the contraction of credit might not have an equal impact on all firms, and result in a disproportionately negative impact on firms that are highly dependent on external financing.

4. Conclusion

Understanding the factors that lead to the growth of individual firms is important for the economic growth and stabilization of the economy, or in other words, the fluctuations of the economy. The existing literature examined the issue based on firm-level data for each country, rather than investigating it for various countries. Given the findings in the existing literature, we tried to analyze the determinants of the

performance of firms across three different Central Eastern European countries, of the Czech Republic, Hungary and Poland, and provide empirical evidence that can provide a cross-country comparison. For this, we use the World Bank's Enterprise Surveys for 2009 and 2013, given the availability of the data.

Our empirical analysis suggests that factors that can account for the performance of firms differ across countries, and the access to external sources of financing may be a crucial determinant of firm growth for Czechia, Hungary, and Poland during the sample period. However, the study does not have enough time periods and detailed information on balance sheets, compared to the data used within the existing literature.

The empirical analysis can be summarized as follows: first, there are cross-country differences that account for the performance of firms. For example, young and small firms grow faster than old and large firms, and only in Poland do the same firm-level characteristics (firm age and size) fail to play a significant role in determining the performance of firms, as they do in Czechia and Hungary. Second, the access to external financing, as measured by the number of loans that firms borrow from banks or the history of loans, matters across all three countries during the given sample period. This also shows that any development in financial markets or an increase in overall accessible credit for firms can contribute to the growth of firms. These results imply that firms that are dependent on external financing can benefit from an increase in credit supply, at least for these three countries.

The empirical results hold important implications for policymakers and their future planned efforts to promote growth and stabilize the economy. The empirical analysis suggests that an increase in credit supply might promote growth by allowing firms that are dependent on external financing to have greater access to necessary funds. In addition, it encourages the setting up of a series of emergency facilities that will help firms with a lack of internal funds borrow from banks or financial institutions.

Our study results provide additional empirical evidence to the existing literature that confirms the effect of finance on firms' growth; however, these empirical results should be re-examined, as the empirical analysis lacks detailed information on balance sheet data, and only examines data over a short time period. In addition, future research should also examine whether injection of credit to firms promotes growth during both periods of tranquility and crisis.

Endnotes

1 Less than approximately 10 % of firms are not included in the empirical analysis

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