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THE IMPACT OF 2008 FINANCIAL CRISIS ON FIRM'S PRODUCTIVITY: EVIDENCE FROM LATVIA, LITHUANIA AND ROMANIA

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Abstract. This study examines the impact of 2008 financial crisis on firms' productivity in Latvia, Lithuania, and Romania by using the World Bank's Enterprise Financial Crisis Survey data. The Work Bank carried out the survey to have a short, quick, and cost-efficient evaluation of the effect of the 2008 global financial crisis on companies in European and Central Asian countries. We find that different firm-specific variables affect the firm's productivity in Latvia, Lithuania, and Romania. Firms benefited from huge market potential and this location proximity to capital city can improve the chance of being less affected from the crisis only in Latvia. On the contrary to the findings for Latvia, the capital city variables are not statistically significant for firms in Lithuania and Romania. Working capital financing matters for firms in Latvia and Lithuania while short-term leverage is important for firms in Lithuania and Romania. More interestingly, we observe that R&D expenses may not able to improve firms' performance at the time of financial crisis.

Keywords: financial crisis, productivity, firm-level data, R&D, capital city

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1. Introduction

The financial crisis that began with the collapse of the subprime mortgage market in United States in late 2007 quickly spread to most countries and lead to a global financial crisis. The world economy which grew by 1.38% in 2008 shrank by 2.1% in 2009. Transition and developed economies were severely affected by the crisis whereas developing economies experienced an increase of 2.7 percent in 2009. After growing at an annual rate of 5.4% and 2.7% in 2007 and 2008, respectively, GDP in Central and Eastern Europe had a decline of -3.6 percent in 2009. While crisis affected all regions, Eastern Europe and Central Asia was hit at most (Clarke *et al.* 2012).

One root cause of 2008 financial crisis has been accused of the deficiency in financial regulation: Loose credit control, credit booms, and the failure of financial regulation in the banking sector (Fuschi, Tvaronavičienė 2014), and that leads to asset price bubbles, eventually economic recession and firm's bankruptcy. However it was argued that not only financial sector (Fuschi, Tvaronavičienė 2014) but also corporate sector in general plays an important role in the financial crisis: In particular, the quality of corporate governance in the corporate sector does matters in the crisis episodes (Fuschi, Tvaronavičienė 2014). A widely shared wisdom is that better corporate governance ensures better financial performance of a firm, and this view was challenged at the time

of extreme business environment, for example at the time of financial crisis, at which quick and instant decision have to be made in response to external shock of decline in demand and credit crunch. In a financial crisis the performance of a firm depends on managerial decision, which may deviate from the norm and it will significantly affect firm's financial performance. Previous studies especially focus on large listed companies while leaving the gap for small and medium enterprises being overlooked.

In this paper, we aim to relevance of firm heterogeneity in response to financial crisis by using the World Bank Financial Crisis Survey data. The Work Bank carried out the survey to have a short, quick, and cost-efficient evaluation of the effect of the 2008 global financial crisis on companies in European and Central Asian countries. The first round of the survey was performed in June-July 2009, the second round - in February-March 2010, and the third round was implemented in June-July 2010. The survey basically aimed to understand the effects of 2008 financial crisis on sales, employment, finances, and expectations. To our knowledge, only a few studies used this survey data. Clarke *et al.* (2012) examine how country and firm characteristics affected financial constraints and firm survival during crisis period in Eastern Europe and Central Asia (ECA). It is shown that firms that had access to external credits are able to cope with decrease in demand and as a result they are more likely to survive during crisis. Large firms face more with changes in the severity of financial constraints while on average those firms have less severe constraints. Moreover, financial constraints are less severe in countries with well-established foreign banks (Fuschi, Tvaronavičienė 2014). Mannasoo and Merikull (2011) analyze the R&D and credit constraint patterns during the pre-crisis and in the aftermath of the global financial crisis. It is shown that at the time of the financial crisis, most of the firms experienced a sharp decline in demand and as a result, the firms' need for external finances has decreased dramatically. The sales growth of the firms increases the likelihood of firms to conduct R&D during the pre-crisis period and during the crisis. Moreover, listed firms are less likely to spend for R&D in the aftermath of the crisis.

This study examines the impact of 2008 financial crisis on firms' productivity in Latvia, Lithuania, and Romania by using the World Bank's Enterprise Financial Crisis Survey data. The Work Bank carried out the survey to have a short, quick, and cost-efficient evaluation of the effect of the 2008 global financial crisis on companies in European and Central Asian countries. We find that different firm-specific variables affect the firm's productivity in Latvia, Lithuania, and Romania. Firms benefited from huge market potential and this location proximity to capital city can improve the chance of being less affected from the crisis only in Latvia. On the contrary to the findings for Latvia, the capital city variables are not statistically significant for firms in Lithuania and Romania. How working capital is financed matters for firms in Latvia and Lithuania while short-term loan are important for firms in Lithuania and Romania. More interestingly, we observe that R&D expenses may not able to improve firms' performance at the time of financial crisis. The rest of the paper is organized as follows: Section 2 provides a literature review. Section 3 describes the data. Section 4 presents the methodology while Section 5 discusses the findings. Section 6 provides a summary and concludes the paper.

2. Literature Review

The literature considers a variety of firm specific variables as the determinants of firms' survival and performance during the financial crisis period. It is documented that there is a substantial heterogeneity across firms which is explained by firm-specific characteristics such as size, age, leverage, collateral, ownership structure, and industry effects (Spaliara and Tsoukas 2013, Vereskun 2013, Dudzevičiūtė 2013; Laužikas, Krasauskas 2013; Mačiulis, Tvaronavičienė 2013; Giriūnas *et al.* 2013, Tvaronavičienė 2014; Korsakienė, Tvaronavičienė, 2014, Antanavičienė 2014, Vasiliūnaitė 2014). Among those, size is considered as an important determinant for firm performance especially in the crisis period. It is generally accepted that smaller firms are more vulnerable to economic downturns mainly due to their limited financial sources. According to Narjoko and Hill (2007), larger firms (especially that are export-oriented and foreign owned) are less affected from domestic crises as they are more likely to borrow from international financial markets. Credit rationing becomes more severe and the tight money policy negatively affects the availability of credits especially for small size firms in the crisis period (Narjoko and Hill 2007; Domac and Ferri 1999). Nugent and Yhee (2002) argue that during a recession or a financial crisis, banks may first screen out SMEs. Small firms are forced to use short-term credits often at high interest rates from nonbank

financial institutions. Besides those financial limitations, small firms are more prone to downturns due to few customers and limited human and technological resources. As small firms are more reliant on fewer customers, they can be easily affected from delays in collections from customers during downturn (Nugent and Yhee 2002). On the contrary, bigger firms are expected to be less affected from the financial crisis due to the scale merit and the higher trust from investors, financial institutions, and customers (Iwasaki 2014). It is also argued that small firms may cope with financial crisis better than bigger firms as they might be for flexible and adapt easily to new business environment more quickly while bigger firms may suffer from inertia, inflexibility, formalized roles, and lack of timely responses to financial crisis (Tan and See 2004; Mačiulis, Tvaronavičienė 2013; Giriūnas et al. 2013, Vereskun 2013.). Sato (2000) show that SMEs respond to crisis by strategies such as flexible switch in products or business lines. As the markets will shrink in crisis periods, small firms might be able to exploit market niches (Varum and Rocha 2012). Moreover, as in general small firms face problems in accessing to formal credits small firms can continue using informal credits during the crisis which may be difficult for bigger firms (Bilgin *et al.* 2012, Vereskun 2013.). Berry *et al.* (2001) show that small firms performed better compared to larger counterparts in the crisis period. As a third stream of research, a limited number of studies document that size and firm performance is not clear (Forbes 2002; Claessens *et al.* 2012; Giriūnas *et al.* 2013, Vereskun 2013).

Ownership structure also plays an important role for firm survival and performance during the downturn. Gonenc and Aybar (2006) examine the performance of Turkish industrial firms listed in Borsa Istanbul on and around the 2001 financial crisis. Concentrated ownership has a negative impact on the stock performance prior and during the financial crisis whereas business group affiliation doesn't have any effect stock prices. It is also found that adjusted returns are positively related with total exposure, firm size and export-sales ratio. Kolasa *et al.* (2010) examine the impact of last global crisis on Polish firms. Foreign firms performed significantly better in terms of sales growth compared to domestic firms both before and during the recent crisis. The exit rates of foreign owned and larger firms are lower while exporting firms are more prone to exiting the market during crisis especially due to the decrease in foreign demand. Varum and Rocha (2011) show that in terms of employment growth, foreign firms are no different than indigenous firms during recessions whereas SMEs' turnover is more severely affected by downturns. Godart *et al.* (2012) show that all Irish firms were negatively affected by the crisis and that their exit probabilities increased during 2008-2009. More importantly, while foreign firms are less like to exit when the economy is stable; during the crisis period foreign firms are no different than domestic firms in terms of their exit probabilities. Liu *et al.* (2012) show that state-owned enterprises in China performed better during the financial crisis (August 2007 through December 2008) due to the less severe financial constraints while they performed poorly before the crisis. Large shareholders' ownership has a U shaped relation with change in Tobin's Q during the crisis period.

Board structure matters for the firm performance during the crisis period. Erkens *et al.* (2012) examine the impact of corporate governance on the performance of 296 financial firms from 30 countries during the 2007–2008 financial crisis. The crisis leads to a decrease in stock prices of all financial firms whereas firms with more independent boards and higher institutional ownership had worse stock returns compared to other firms. Institutional investors encouraged managers to increase shareholder returns by greater pre-crisis risk taking. And independent board members encouraged manager to raise more equity capital during the crisis which then caused a wealth transfer from existing shareholders to debt holders. Francis *et al.* (2012) show that board independence does not affect firm stock performance proxied by buy-and-hold abnormal returns during the crisis (October 2007 to March 2009). However, after redefining independent directors as outside directors who are less connected with current CEOs, a positive and significant relationship between this measures namely strong independence and firm performance is found. It is also shown that outside financial experts are important for firm performance. Moreover, the effect of outside financial experts on firm performance is higher than that of strong independence. Iwasaki (2014) document that board of directors and audit committee have an important role for the survival probability of Russian firms during the financial crisis. Van Essen *et al.* (2013) by using 1,197 firm data across 26 European countries, find that CEO duality and large board size are beneficial during a crisis whereas large numbers of board sub-committees decreases the abnormal returns.

Geographic location can be also considered as an important factor that determines the performance of firms. Geographic proximity to big cities is crucial for the survival and performance of a company as it contributed to easy access to potential customers and raw material supply. Stearns *et al.* (1995) find that in comparison to other firms in, firms in urban areas have less chances of survival while firms in rural areas have more chances of survival. Sato (2000) show that there is a negative correlation between urban proximity and the performance of SMEs meaning that the more urban the location, the lower the performance. Hoogstra and van Dijk (2004) showed that the location of a firm had an influence on the performance of a firm proxied by employment growth. It is found that a higher number of people in a range of 5 kilometres has a positive effect on firm employment growth. Sridhar and Wan (2010) find that capital cities are attractive for firms to locate as small cities have limited market size meaning higher transportation costs.

3. Data

We use the World Bank's Enterprise Financial Crisis Survey data which was implemented during 2008, 2009, and 2010 to address the impact of the global economic crisis on the corporate sector. [1] The survey includes firms from manufacturing, retail, and other services industries[2] and it is conducted through telephone interviews. The survey basically aimed to understand the effects of 2008 financial crisis on sales, employment, finances, and expectations. The survey covered data for unlisted firms from Bulgaria, Hungary, Latvia, Lithuania, Romania, and Turkey. The survey provides data on how the crisis affected the corporate sector; how firms responded, and their expectations about the business environment in post-crisis period. Several business attributes are claimed to be important determinants for corporate performance, especially during downturn periods and the survey provides important firm-specific data.

As The World Bank Financial Crisis Survey data is not commonly used in the literature, we would like to give some details about the survey in this section. The first part of the survey covered the details such as the region, city, size, and industry of the firm. The size and industry distribution of firms surveyed in 2010 are given in Table 1. It is seen that there is a homogenous distribution among the size of the firms surveyed. 41% of firms surveyed is small size in Lithuania.

Table 1. Size and Industry Distributions of Firms in World Bank Financial Crisis Survey

Panel A. Size			
	Latvia	**Lithuania**	**Romania**
Small >=5 and <=19	36%	41%	29%
Medium >=20 and <=99	31%	32%	38%
Large >=100	33%	28%	33%
Panel B. Industry			
	Latvia	**Lithuania**	**Romania**
Manufacturing	34%	37%	37%
Retail	34%	24%	27%
Other services	32%	39%	37%

Source: Correa *et al.* (2010)

Section B focuses on changes in sales and supplies in the crisis period. In more details, the change in sales compared to previous period, sales expectations, the share of national sales, indirect exports, and direct exports, and capacity utilization ratio. The average decline in sales in crisis period is around 35% in the crisis period. Firms in Latvia and Lithuania experienced a sales decline of 48.4% and 48%, respectively. Firms operating in food and electronics industry are less affected from the crisis compared to firms in other industries while the biggest sales drops are observed in basic metals industry and construction industry. The decline in demand was almost uniformly distributed geographically among capital cities, cities with a population of over 250,000 to 1 million, and cities with less than 50,000 population (Correa and Iootty 2010). In section C, survey examined the labor force of the firm. The firms in all countries had fewer permanent full-time employees crisis period compared to pre-crisis period.

Section D asks about the financing decisions of firms such as whether the firms delay payments, share of the sales on credits, working capital financing, current level of total liabilities, share of debt in foreign currency, share of short term liabilities. Firms in Latvia, Lithuania, and Romania had an average short term ratio of 49.2%, 80.1%, 56.9% and an average foreign currency debt ratio of 39.4%, 20.7%, and 31.2%, respectively. This shows that firms mostly rely on short term debt. During the crisis, firms tend to use internal fund to finance working capital (Correa

[1] More details about the survey can be found at http://www.enterprisesurveys.org

[2] Standard Industrial Classification of All Economic Activities (ISIC) codes are 15-37, 45, 50-52, 55, 60-64, and 72.

and Iootty 2010). Around half of the firms in Latvia and Lithuania delayed their payments to authorities or suppliers for more than one week.

Section E questions the impact of financial crisis on firms. According to the survey, the most important effect of the financial crisis is the decline in demand compared with increase in the level of debt, increase in input cost, and reduced access to credit. The drop in demand was experienced by around 75 percent of firms (75.4%, 70.5% and 78.5 of firms in Latvia, Lithuania, and Romania, respectively) (Correa and Iootty 2010).

4. Methodology

We use panel data (2009-2011) with fixed effects (which is chosen over random effects according to Hausman Test) to control for unobserved firm heterogeneity as widely discussed in the current literature. The empirical findings are based on the following regression, with year dummies and industry dummies included. Notice that results for some variables are not available for some countries because of insufficient data.

We use the following model to analyze the determinants of firm productivity in the crisis period.

$$\text{LnPROD}_{it} = \beta_0 + \beta_1 \text{Capital City}_{it} + \beta_k \text{Size}_{it} + \beta_3 \text{Internal Finance} + \beta_4 \text{ External Finance} + \beta_5 \text{Short term Loan} + \beta_6 \text{ R \& D} + \varepsilon_{it} \quad (1)$$

The dependent variable, $PROD_{it}$ is firms' productivity proxied by sales per full-time worker.[3] Where it represents individual firm i and t represents year t, spanning from 2009-2011. k is category of firm size: 1= small firm, 2= medium firm, 3= large firm. $Size_{it}$ is a multinomial variable; it represents the firm size, with small firm taken as the benchmark. [4] *Capital City* is a dummy variable[5], it takes 1 if the firm locates in the *Capital City*, and otherwise it takes 0. The variable of $Internal\ Finance_{it}$ is the proportion of firms' capital that was financed by its own retained earnings.[6] $External\ Finance_{it}$ represents proportions of firms' capital finance by the banks[7]. $Short\ term\ Loan_{it}$ represents the level of short term loan.[8] The *R&D* is about the change of Research and Development inputs.[9] We also include the variable of the *proportion of foreign debt* in the model, and we found no significant impact on productivity together with smaller observations, therefore we do not report the results. For Lithuania and Romania, we exclude the firm size variable because it is very insignificant.

5. Findings

Table 2, 3, and 4 present the empirical results for Latvia, Lithuania, and Romania, respectively. It is seen some of the firm-specific characteristic are crucial for enterprises in face of financial crisis (Tvaronavičienė 2014, Vasiliūnaitė 2014). Firms benefited from huge market potential and this location proximity to capital city can improve the chance of being less affected from the crisis only in Latvia (Tvaronavičienė 2014, Vasiliūnaitė 2014). The estimated coefficient of "Capital City" is positive and statistically significant in all models for the firms in Latvia. The productivity of firms located in the capital city during the financial crisis was higher than firms located in other areas. This finding is consistent with the existing literature of geographical economics. Numerous studies have been investigating the relationship between firm performance and firms' locational distribution, resting on the importance of innovation, knowledge sharing, knowledge transfer and technology acquisition (Beugelsdijk 2007; Knoben and Oerlemans 2006). On the contrary to the findings for Latvia, the capital city variables are not statistically significant for firms in Lithuania and Romania. This difference may be attributed to city populations and number of developed cities. For example, in Latvia the most crowded city is the capital city with a population of around 660,000 and the remaining cities are all populated fewer than 100,000. Although in Lithuania and Ro-

[3] The construction of the variable comes with question e.6. in the questionnaire "What were this establishment's total annual sales" and c.1. "At the end of the last completed month, how many permanent, full-time employees did this establishment employ? Please include all employees and managers"

[4] For details, look at "A.6 Size".

[5] From the World Bank survey, question "A.3 Size of locality".

[6] From question d.6. " Proportion of working capital financed with internal funds or retained earnings".

[7] Details can be found in the questionnaire, d.5 "please estimate the proportion of this establishment's working capital that was financed from banks?"

[8] Question d.9. "What percentage of the total level of liabilities (debt) of this establishment has a term to maturity of less than one year (short term)?"

[9] Question f.1 " In the last 12 months how did your research and development spending change compared to 2008?"

mania the capital cities have the highest population, there are cities which are relatively crowded and some cities are developed like the capital cities.

Although the literature considers size as an important determinant for firm performance especially in the crisis period (Giriūnas *et al.* 2013), we do not find evidence of firm size effect: which implies no matter what is the size of the firm it was still affected by the crisis. Our findings support supportive evidence to Forbes (2002) and Claessens *et al.* (2012) who show that size and firm performance relation is not clear or not related at all.

Table 2. Determinants of Firms' Productivity: Panel Data Analysis (Latvia)

	(1)	(2)	(3)	(4)
Capital City	**0.472*****	**0.464*****	**0.553*****	**0.552*****
	(3.27)	**(3.18)**	**(3.50)**	**(3.47)**
Medium Firm	-0.245	-0.243	-0.171	-0.148
	(-1.27)	(-1.27)	(-0.85)	(-0.74)
Large Firm	0.246	0.215	0.268	0.287
	(1.43)	(1.23)	(1.41)	(1.50)
Internal Finance		**0.00512***	**0.00705****	**0.00721****
		(1.90)	**(2.17)**	**(2.22)**
External Finance		0.00439	0.00330	0.00368
		(1.11)	(0.87)	(0.97)
Short-Term Loan			0.00136	0.00159
			(0.91)	(1.05)
R & D				**-0.543*****
				(-4.30)
Constant	**10.26*****	**10.20*****	**10.08*****	**10.03*****
	(72.42)	**(54.93)**	**(49.06)**	**(49.49)**
N	422	422	324	324
adj. R^2	0.081	0.102	0.134	0.146

Numbers in parentheses are t-values. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively

For firms in Latvia and Lithuania, internal finance which is the proportion of firms' working capital that was financed by its own retained earnings positively affect the productivity. External finance variable measured by proportion of firms' working capital finance by the banks is positively associated with firm productivity for firms only in Lithuania under model 1. In general, we find that external finance is not related with productivity while Claessens *et al.* (2012) find that dependence on external finance for working capital led to a decrease in firm-level sales in the 2008–09 crises for 7722 manufacturing firms from 42 countries. Short-term loan has a positive impact on productivity for firms in Romania and Lithuania. This is on the contrary to the findings of Van Essen et al. (2013) who show that leverage is negatively associated with firm performance. Recently, Spaliara and Tsoukas (2013) explore the link between firm survival and financial healthiness during the 1997-1998 Asian crises by using a panel of five Asian economies. It is shown that firms' financial status plays an important role in terms of survival during the Asian crisis. More specifically, leverage, profitability, and collateral are important determinants of survival. However, the firms in those emerging markets may have problem in accessing to long-term leverage during crisis and tend to use more short-term loans to sustain daily operations. Therefore, those short-term funds may be used to boost productivity.

Coefficient estimates for State aid are statistically significant only for firms in Romania. There is a negative relationship between state aid and productivity. Stollinger and Holzner (2013) analyze the impact of state aid on increasing exports in EU. It is argued that well-functioning governments implement more successful industrial policies and the state aid provided is more inductive to productivity and exports. Our findings support the findings of Stollinger and Holzner (2013) who document that in Romania which has the lowest government effectiveness score among the 27 EU Member States, the marginal effect of state aid turns negative.

The coefficient estimates for R&D are negative for firms in all countries while it is only significant for firms in Latvia. For firms who still undergo research innovation activities lose competitiveness at the short time period during the crisis. Srinivasan *et al.* (2011) also provide similar results. It is found that marginal effects of R&D on profits are negative during recession but this result may differ by firm characteristics.

Table 3. Determinants of Firms' Productivity: Panel Data Analysis (Romania)

	(1) A	(2) B	(3) C
Capital City	-0.173	-0.313	-0.237
	(-0.49)	(-0.95)	(-0.60)
Internal Finance	0.00249	-0.00468	-0.00713
	(0.22)	(-0.43)	(-0.61)
External Finance	-0.00435	-0.00822	-0.00581
	(-0.48)	(-0.95)	(-0.65)
Short-Term Loan		**0.000000161*** **	**0.000000160*** **
		(3.06)	**(2.79)**
State Aid			**-1.935*** **
			(-2.91)
R & D			-0.0112
			(-0.03)
Constant	**12.18*** **	**12.30*** **	**11.99*** **
	(14.01)	**(15.13)**	**(14.39)**
N	66	66	66
adj. R^2	0.025	0.156	0.113

Numbers in parentheses are t-values. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively

Table 4. Determinants of Firms' Productivity: Panel Data Analysis (Lithuania)

	(1) A	(2) B	(3) C
Capital City	0.202	0.165	0.166
	(1.09)	(0.89)	(0.90)
Internal Finance	**0.00617** **	**0.00533***	**0.00540***
	(2.14)	**(1.84)**	**(1.85)**
External Finance	**0.00419***	**0.00379**	**0.00360**
	(1.66)	**(1.50)**	**(1.41)**
Short-Term Loan		**1.05e-08** **	**1.10e-08** **
		(2.01)	**(2.09)**
State Aid			0.306
			(0.66)
R & D			-0.263
			(-0.92)
Constant	**11.45*** **	**11.44*** **	**11.43*** **
	(81.00)	**(81.37)**	**(80.86)**
N	276	276	276
adj. R^2	0.013	0.086	0.093

Numbers in parentheses are t-values. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively

Conclusions

This study examines the impact of 2008 financial crisis on firms' productivity in Latvia, Lithuania, and Romania by using the World Bank's Enterprise Financial Crisis Survey data. The Work Bank carried out the survey to have a short, quick, and cost-efficient evaluation of the effect of the 2008 global financial crisis on companies in European and Central Asian countries. We find that different firm-specific variables affect the firm's productivity in Latvia, Lithuania, and Romania. Firms benefited from huge market potential and this location proximity to capital city can improve the chance of being less affected from the crisis only in Latvia. On the contrary to the findings for Latvia, the capital city variables are not statistically significant for firms in Lithuania and Romania. How the working capital is financed matters for firms in Latvia and Lithuania while short-term loan are important for firms in Lithuania and Romania. More interestingly, we observe that R&D expenses may not able to improve firms' performance at the time of financial crisis.

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