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Research Article

Complex Interplay of Eastern Bloc SMEs Trade Credit Determinants: Changes due to the Global Financial Crisis

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We investigate whether the determinants of small and medium enterprises' (SMEs) trade credits taken for purchasing fixed assets suffered substantial changes due to the global financial crisis (GFC). The geographical focus of this paper covers 18 former Eastern bloc countries. The data sample comprises opinions of the SMEs top managers relative to the trade credit financing. The two-step Heckman procedure is applied to study complexity of the trade credit determinants. We find that before the GFC the equity concentration and inflation have negatively impacted the trade credit while foreign ownership and company's longevity have had a positive effect. The GFC has changed this complex relationship. We evidence that, after the GFC, equity concentration and state subsidies have a positive effect.

1. Introduction

Large companies are actively using various sources of funding and are more flexible in management decisions than small and medium enterprises (SMEs). Our aim is to assess the role of trade credits in financial management decisions of SMEs. We identify the determinants of the active use of trade credits in the Eastern bloc countries. Traditionally, trade credits are perceived by managers as a source of financing for working capital. A feature of SMEs in countries with a less developed financial system is the use of trade credits to finance fixed assets.

Our hypothesis is that management decisions on the use of trade credits have changed substantially after the global financial crisis (GFC). Among the factors of influence, we consider the macro-indicators and specific firm-level factors: the size, ownership structure, owner control, and managerial experience. Since our research is based on business surveys, we understand that managers' responses are influenced by their motivation to disclose information, therefore all our conclusions are made under the control of information disclosure.

SMEs are commonly considered as an important pillar of emerging economies, see Yoshino and Taghizadeh-Hesary [1]; Wellalage and Fernandez [2]; and references therein. Still, a rather limited access to finance for SMEs represents a common handicap for the acceleration of economic development in both developed and developing markets, see Casey and O'Toole [3]; Lee et al. [4]; Andrieu et al. [5]; McGuinness et al. [6]; and Schwab et al. [7]. The problem of insufficient financing to SMEs has been attracting a lot of attention from academic community and policy makers especially since the adverse impacts of the GFC, which began to unfold in the second half of 2007, see de Maeseneire and

Clayes [8]; Carbó-Valverde et al. [9]; and Gupta and Gregoriou [10] among many other researches on these subjects.

Following the GFC, access of SMEs to stable finance was severely damaged. In particular, De Maeseneire and Clayes [8]; Chakravarty and Xiang [11]; and Yoshino and Taghizadeh-Hesary [1] emphasize the growing problem of information asymmetry, which due to opacity and lack of transparency makes it much harder for SMEs to attract debt financing than for large corporations. This situation is aggravated by a relatively high default risk of SMEs and lack of high-quality collateral, perhaps with exception for manufacturing SMEs; see Andrieu et al. [5]. In addition, along with large corporations, SMEs access to bank loans becomes also adversely impacted by the post-GFC tightening of banking regulation. For all these reasons, on one hand, SMEs used to relatively easy raise money by mean of bank loans before the GFC while, on the other hand, still suffer from financing constraints brought about by the GFC.

To solve this major worldwide SME problem various credit guarantee schemes, government programs, mini-bond issuance, Internet based "crowd-funding," and other innovations have been introduced to improve the supply-demand balance in the SME financing. Among alternative forms of financing many SMEs have started considering trade credit from their suppliers more actively, see Casey and O'Toole [3]; Carbó-Valverde et al. [9]; Andrieu et al. [5]; McGuinness et al. [6]; among many others. The trade credit channel is quite important as, the mentioned above financial innovations still lack appropriate regulations and also are far from being sufficient as an aggregate flow of credit to SMEs from non-traditional sources is well below the SMEs expectations, see Altman et al. [12]. Even in Europe, in 2019 SMEs financing is still predominantly represented by traditional sources: about a half is originated by bank loans and overdrafts, about one quarter by leasing, while about one fifth is trade credit, see ECB [13].

However, there are important differences between SMEs bank financing and raising funds from SMEs suppliers. For instance, Huyghebaert et al. [14]; investigating the choice between bank debt and trade credit in Belgian startups, find that the suppliers are more loyal and tolerant, than banks, to their customers-borrowers with financial difficulties. This tolerance comes at the expense of a relatively higher trade credits costs in comparison to bank loans. In line with these findings, Comeig et al. [15] reveal that in general a bank loan is a less expensive source of SMEs funding because banks, while conceding loans, take into account information about the subjacent risks based on the history of relationship lending.

It is necessary to address differences in objectives that are targeted by SMEs while borrowing from counterparties. Borrowing for financing working capital and fixed assets has different levels of risk. Trade credits for purchasing fixed assets can be considered as an intermediate stage of companies' integration, which requires a high level of trust and information transparency.

Two types of the firm's stakeholders—financial (banks) and non-financial ones (suppliers) are faced with the problem of information asymmetry, because they have different competencies regarding the analysis of company data. Banks can obtain detailed information on the firm's financial indicators, including credit history, they focus more on the past dynamics of the firm [14]. Comeig et al. [15] reveal that lenders take into account information about risks of SMEs based on the history of relationship lending. A successfully repaid loan allows the firm to decrease the cost of capital. Suppliers obtain a large range of non-financial data, they are better informed about the quality characteristics of the company, understand the specifics of business processes, appreciate potential risks well, and thus, better predict the future of the company [14].

Carbó-Valverde et al. [9]; Andrieu et al. [5] reveal the determinants of the use of bank loans and trade credits as a whole, including capital attracted for different purposes, e.g., to finance working capital, capital goods, intangible assets, and so on. However, these studies lack details regarding the purposes of fund raising, especially when the focus is on financing of fixed assets. To the best of our knowledge the issue related to the purchase of fixed assets with funds raised as trade credits from suppliers has never been studied before.

It is worth noting that from historic perspective, there are a few studies dedicated to the use of trade credit by SMEs prior to the GFC; see, for instance, Huyghebaert et al. [14]. For the post GFC period, there are also several studies on this subject; see Casey and O'Toole [3]; Carbó-Valverde et al. [9]; Andrieu et al. [5]; McGuinness et al. [6]; etc., which use firm specific data on SMEs. However, to the best of our knowledge there are no comparative studies, analyzing the use of trade credit by SMEs prior to the GFC versus after the GFC, i.e. assessing whether trade credit plays a similar role under different economic conjunctures.

It is also important to mention that the major body of the literature on SMEs funding is focused on EU and US markets, especially concerning trade credit facilities, see Chakravarty and Xiang [11]; Casey and O'Toole [3]; Carbó-Valverde et al. [9]; Andrieu et al. [5]; McGuinness et al. [6]; Altman et al. [12] and so on. Although there are rather a few studies, covering emerging markets, in particular regarding influence of innovation on SMEs funding and governmental credit guarantee programs for SMEs, see, respectively, Wellalage and Fernandez [2] and Yoshino and Taghizadeh-Hesary [1]; the specific research dedicated to the former-Eastern bloc countries, to the best of our knowledge is rather absent in the extant literature.

Having in mind the incompleteness of the SME research coverage, outlined in the three previous paragraphs, the present work fills several important gaps in the existing literature by investigating a widespread database, containing more than 20 thousand observations on SMEs from 18 Eurasian developing counties, belonging to the former Eastern bloc. In these countries, the culture of the entrepreneurship is less advanced than in developed ones and the level of trust of their populations towards SMEs is low even when compared to the level of trust towards domestic big businesses and state-owned companies (see, for instance, Edelman Trust Barometer (2015)): https://www.edelman.com/trust/2015-trust-barometer. So, to solve the problem of the sample bias, caused among other factors by biased

responses registered in the database we apply the two-step Heckman procedure, see Heckman [16, 17].

Our contribution to the existing literature is three-fold:

First, we collect new data on purchase of fixed assets with funds raised in a form of trade credits from suppliers. Our study provides specific details regarding the purposes of fund raising, especially shedding light on financing of fixed assets, and reveals the determinants of the intensity of trade credits usage. Earlier papers deal with determinants of the total value of trade credits or trade credits for financing working capital. In our study, we focus on trade credits for purchase of fixed assets, i.e. on long-term trade credits from counterparties.

Second, our paper investigates how the GFC influenced the determinants of the use of SMEs trade credit. To the best of our knowledge, it is the first study that documents how SME firm-level factors, such as equity concentration, foreign participation in equity, SME age, and state subsidies influence the intensity of use of trade credits. We perform comparative analysis of the determinants during the precrisis and postcrisis periods, and show that before the crisis bank loans and trade finance are complementary sources while after the crisis this relationship does not hold any more, as we observe augmenting use of the trade credit not accompanied by the growth of bank financing.

Third, the geographic coverage of our research represents an important enhancement to the existing body of the literature, as we cover the emerging countries of the former Eastern bloc, which are not properly addressed in the existing research on SME themes. We employ Business Environment and Enterprise Performance Surveys (BEEPS) developed by the World Bank and the European Bank (https://enterprisesurveys.org), which are based on face-to-face interviews with firm managers and owners and report diverse firm-level data on SMEs from East European and Central Asian markets. Hence, our results are potentially useful for improvement of the access of SMEs to finance in the regions where the culture of the entrepreneurship is less advanced than in the developed economies.

The rest of the paper is organized as follows. Section 2 puts our study into the perspective of the related state of art. Section 3 outlines the methodology and model variables. Section 4 presents the results. Section 5 concludes.

2. Literature Review and Hypotheses Statement

Issues of the ratio of trade credits and bank loans for companies in the real sector of the economy are being actively investigated. Carbó-Valverde et al. [9] based on the survey data analyze whether trade credits are an alternative source of external financing, in relation to bank lending, for SMEs during the GFC. Their sample includes 40 thousand SMEs, but the only country (Spain) is under consideration. Our study is also based on survey data, but the sample includes over 20 thousand SMEs from 18 emerging markets. Unlike Carbo-Valverde et al. [9], the focus of our study is on the equity structure and concentration.

Various studies focus on institutional factors that determine the choice of a source of funding by SMEs. Lee et al. [4] consider SMEs from the only country (UK) and investigate the influence of institutional factors and firm's belonging to the innovation sector. Hernández-Cánovas and Koëter-Kant [18] analyze the role of protection of creditors' rights and compliance with laws. The sample includes several European markets, but it is not very large (it consists of 3300 SMEs).

Important factors that influence the choice of a financing source are the age and the size of the firm. Andrieu et al. [5] investigate the determinants of bank loans and trade credit for SMEs in developed European markets in 2009–2014. We also analyze and compare results for the two time periods–before and after the GFC, but unlike Andrieu et al. [5], our sample consists of emerging markets.

A number of studies consider the role of banks for SMEs financial constraints and availability of funding [19–21]. Unlike previous studies, our research focuses on firm's internal characteristics (equity structure and concentration, age, state subsidies) and macroeconomic factors.

Rostamkalaei and Freel [22] raise the question of discriminating against SMEs by the cost of the loan on the sample of 250 UK SMEs on 2007 survey data. The results show that firms with high growth rates and introducing new products to the market are more likely to attract loans at higher rates. Unlike Rostamkalaei and Freel [22], we consider a cross-country sample and two time periods.

The effect of the concentration of equity on the ratio of bank loans and trade credits is ambiguous [23, 24]. In our study we analyze not only the effects of equity concentration, but also equity structure–participation of the government and of a foreign owner on a cross-country sample.

Our analysis of influence of macroeconomic factors continues the line of the study of Chakravarty and Xiang [11] who build their research on the data of the World Bank survey conducted during 2002–2003 on companies from 10 developing countries. Unlike Chakravarty and Xiang [11], we analyze and compare results for two time periods–before and after the GFC. Our sample is wider: we consider 18 emerging markets.

An important issue is the methodology of research based on the survey data due to possible sample bias: an answer to one question may depend on answers (or gaps in answers) to other related questions. Andrieu et al. [5] investigate the determinants of bank loans and trade credit for SMEs on the base of probit regressions models. Chakravarty and Xiang [11] use logistic regression models to find factors discouraging firms to receive loans. We see a disadvantage of these studies in ignoring the bias problem. A feature of our research is application of an original methodology–the Heckman model which allows us to solve the problem of sample bias.

We put forward the following hypotheses regarding the determinants of the intensity of use of trade credits by SMEs:

2.1. H1. The share of trade credits in the fixed assets depends on the concentration of equity. The presence of a sole owner or a large controlling owner is considered by SME

counterparties as a risk factor. The perception of this risk depends on the macroeconomic environment.

Since in the countries under consideration, property rights, generally speaking, are poorly protected, and property rights to fixed assets appeared recently (in the 1990s), the problem of information asymmetry is especially relevant. The analysis of the effect of ownership concentration on the company's relationships with contractors is of academic interest.

We assume that if the entire stake of shares (all equity) is owned by the sole owner of the SME, he or she is an entrepreneur. The situation with the presence of a large controlling owner and several other owners in the structure of equity capital can be interpreted in several ways. Option one is the appearance of an external owner through the sale of a part of the business by the founding entrepreneur. The second option is a forced assignment of a part of the capital, for example, as a result of a loan default. At the same time the fact that, information asymmetry increases with increasing concentration of equity capital is confirmed by Lin et al. [25] for the Chinese market, Haiyan et al. [26] for the New Zealand market. So, the presence of a sole or large controlling owner can be associated with the possibility of investing in high-risk projects in the interests of the controlling owner. In this regard, it can be assumed that the relative share of trade credits in the fixed assets will decrease with increasing ownership concentration. We consider a large controlling owner as an institutional investor, and we assume that suppliers may perceive its presence as a signal of a possible conflict of interest of the owners or of the unfavorable financial position of the firm. On the contrary, we assume that before the crisis, in the absence of a blocking stake, the owners had a deterrent effect on each other when making high-risk decisions, and such a structure was positively perceived by suppliers.

At the same time, for the postcrisis period, due to changes in the macroeconomic environment and increased competition, we expect changes in the direction of influence on the share of trade credits in the fixed assets in case of a sole owner-entrepreneur. So, Andrieu et al. [5] using data on companies in developed EU markets during the period 2009–2014, find that access to bank loans and trade credits is easier if the owners are entrepreneurs. The number of highly profitable and, accordingly, highly risky projects in the postcrisis period has decreased, the cost of debt financing has decreased. In case of the sole owner, there is no conflict of interests, and in addition, he or she can provide effective control over management actions [24]. Ciampi [27] shows that greater ownership concentration is negatively correlated with the probability of default of SMEs for the Italian market. According to Ciampi [27], large shareholders of SMEs are highly motivated to work hard for the success of the firm and are aimed at the stability and survival of the firm in the medium and long term. We assume that suppliers have revised the crediting policy, priority attention has been paid to the absence of a conflict of interests of owners and to ensure control over the actions of management. We assume that after the crisis, amid changes in the macroeconomic environment, there was a reassessment of risks on the part of suppliers, the scattered ownership structure became a negative signal of a potential conflict of interest between owners.

2.2. H2. The share of trade credits in the fixed assets depends on inflation. Expensive money narrows the possibilities of trade crediting.

Significantly higher rates of inflation are more common for emerging markets than for developed economies. During the postcrisis period, inflation rates in developed markets were close to 1-2 percent, and we assume that an increase in the inflation rate can be considered as a signal of economic growth. On the contrary, for emerging markets, an increase in the rate of inflation is considered by investors as a risk. The relatively high inflation will impede the financing of fixed assets by means of agents (equipment suppliers). The inflation rate is a proxy indicator of the cost of debt financing. Expensive money hinders the possibilities of trade credits. Chakravarty and Xiang [11] reveal that high interest rates demotivate companies from borrowing.

2.3. H3. The age of the company has a positive effect on the share of trade credits.

We consider the age of the company as a proxy variable of managerial experience. This hypothesis is based on the results by Rostamkalaei and Freel [22] evidencing that the age of the company has a significant negative impact on loan rates and that SMEs are discriminated by cost of debt. Andrieu et al. [5] show that the availability of bank lending is significantly influenced by the size and age of the company. Information asymmetry is enhanced in the case of young firms that lack an accounting and credit history. Berger and Black [28] underline that SMEs are less transparent, compared to large firms, so SMEs can be discriminated by large banks that prefer to lend money to transparent firms. So, we assume that it is less expensive for suppliers to obtain information on firms with a longer history; therefore, such firms are provided with more trade credits [5, 19].

2.4. H4. Government support (subsidies) has a positive effect on the intensity of the use of trade credits, and this effect is more pronounced in the postcrisis period.

We consider government support as managerial administrative resource of a company. In the postcrisis period, state intervention in the economy increased, while government subsidies were widely used to solve the financial problems of companies. Receiving government subsidies is a positive signal of quality for contractors and lenders. Meuleman and de Maeseneire [29] conclude that the receipt of R&D subsidies by SMEs is a signal of quality for lenders and enhances the ability of SMEs to attract long-term financing.

2.5. H5. Trade credits and bank loans are complementary, not mutually exclusive sources of financing.

This hypothesis is based on the results by Andrieu et al. [5] for European SMEs, which demonstrate that bank

lending and trade credits are complementary sources of financing. In assessing the company's creditworthiness, the provision of trade credits by suppliers may be a positive signal for banks, and vice versa.

A description of the model variables and the expected direction of influence are presented in Table 1.

3. Methodology

Our study is based on the survey of economy's private sector—"EBRD—World Bank Business Environment and Enterprise Performance Survey (BEEPS)." Our research is focused on the specifics of the decision-making regarding businesses financing by small and medium-sized companies.

Data represent a spatial sample at a representative level. The sample includes companies from 18 Eastern Bloc countries for the period from 2002 to 2014, divided into two sub segments: from 2002 to 2005 (hereinafter—the precrisis period) and from 2011 to 2014 (hereinafter—the postcrisis period). Initial number of companies for the period 2002–2005 is 10522, and for the period 2011-2014—10728, of which medium and small companies constitute 80.3 and 87.4 percent, respectively.

Analyzing the data, we build the assumption that there is a problem of selectivity of the sample, which can lead to a shift in the regression estimates. Heckman [16, 17] proposed a method that considers the emerging bias - the Heckman model. And since the construction of models is carried out on a large data array, a simple one-step procedure takes too much time due to the significant number of iterations. Therefore, our paper uses the two-step procedure of Heckman [17].

Our assumption is as follows: the intensity of use of trade credits depends on the propensity of companies to disclose information about sources of funding.

We consider the situation with the existence of one target equation (outcome) and one selection condition (select). The target equation is the percentage of trade credits in the fixed assets, and the selection condition is the dummy for disclosing information about the company's financing sources.

For the correct construction of the model, the condition for the correlation of random errors must be met, which determines the existence of the problem of selectivity. The decision to disclose information about sources of funding and the share of credit in the fixed assets depends not only on observable but also unobservable factors.

Taking the assumption of the presence of latent variables, in general, the model can be represented as the following equation for the share of trade credits:

$$y_i^* = \beta X_i' + u_i, i \in \{1, \ldots, n\}, \quad (1)$$

where y_i^* is the share of trade credits in the fixed assets, X_i' are the determinants of the share of trade credits (Table 1), β are the regression coefficients, i is the number of a company in our sample, u_i is the random error, n is the number of observations.

The selection equation has the form:

$$z_i^* = \gamma W_i' + \varepsilon_i, \quad (2)$$

where z_i^* is the dummy variable of disclosure of information on sources of financing, W_i' are the determinants of disclosure of information (Table 1), γ are the regression coefficients, i is the number of a company in our sample, ε_i is random error, n is the number of observations.

The relationship of the share of trade credits observed in the respondents' answers and the latent variable is as follows:

$$z_i = \begin{cases} 1, if\ z_i^* \geq 0 \\ -1, if\ z_i^* < 0 \end{cases} y_i = \begin{cases} y_i^*, if\ z_i = 1 \\ \text{unobserved}, if\ z_i = -1 \end{cases}, \quad (3)$$

where y_i is the observed (in the respondents' answers) share of a trade credit for company i, y_i^* is the desired level of a trade credit, z_i is the dummy variable of disclosure of information on sources of financing, which takes value 1 if the company discloses this kind of information, and "–1" otherwise. z_i^* is usefulness of using trade credit, X_i' and W_i' are vectors of explanatory variables, β and γ are vectors of regression coefficients of explanatory factors, u_i and ε_i are random errors, n is the number of observations, where $\begin{pmatrix} u_i \\ \varepsilon_i \end{pmatrix} \sim N\left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} \sigma^2 & \rho\sigma \\ \rho\sigma & 1 \end{bmatrix}\right)$.

With non-random selection, the dependent variable takes the form:

$$y_i = \beta X_i' + \rho\sigma\widehat{\lambda}_i + \nu_i, if\ y_i^* > 0,$$

$$\widehat{\lambda}_i = \frac{\phi\left(\widehat{\beta} X_i'\right)}{\Phi\left(\widehat{\beta} X_i'\right)}, \quad (4)$$

where $\widehat{\lambda}_i$ is inverse Mills ratio, ν_i is a random error with a zero expectation and variance equal to conditional variance $D(y_i^* | z_i^* \geq 0)$. When testing hypotheses about the significance of the coefficients of independent variables, it is important to consider that the distribution ν_i is heteroscedastic; therefore, the numerical interpretation of the coefficients in front of the estimated factors will be omitted.

In our case, the two-stage Heckman model is such that in order to obtain consistent estimates, at the first stage, it is necessary to evaluate the choice equation using the probit model to reveal information about funding sources (i.e. participation equations) and get estimates λ_i. And in the second step, using the obtained estimates of the inverse Mills ratio, it is necessary to estimate the relative amount of the trade credit in the fixed assets for the subsample of companies that disclose information about the sources of funding. That is, the covariance matrix of estimates of the coefficients of the regressors is adjusted considering the dependence of the observations.

It is worth emphasizing that the Heckman model, despite its versatility, requires a careful approach to the selection of explanatory variables. Due to the nonlinearity of the inverse Mills relation, the equation will be evaluated even in case of the full identity of the vectors of independent factors of the considered equations, but in this case, there is a probability of a strong correlation of the Mills ratio with regressors. Thus, it is advisable not to include the same set of variables in

Table 1: Description of the model variables and expected direction of influence.

Variable	Description	Source	Sign
Disclosure about finance sources	Dummy: 1—if a company discloses information about finance sources for fixed assets, 0—otherwise	BEEPS	
Trade_credits	Percent of fixed assets funded by trade credits	BEEPS	
Independent variables			
Obstacle to finance	Barriers to access to finance, characterizing its availability and cost. It is based on the variable $k30$ (source: BEEPS). If $k30 = 0$ (no obstacle to finance), 1 (minor obstacle) or 2 (moderate obstacle), than obstacle = 0 (no severe obstacle to finance).If $k30 = 3$ (major obstacle) or 4 (very severe obstacle), than obstacle = 1 (severe obstacle to finance)	BEEPS	(+)
Sme	Dummy of small and medium companies: 1—yes, 0—no	BEEPS	(+)
Big	Dummy of big companies: 1—yes, 0—no	BEEPS	(−)
Age	Age of a company, years	BEEPS	(+)
Share100	Dummy: 1—there is the only stockholder, 0—otherwise	BEEPS	(−) before the crisis, (+) after the crisis
Share75	Dummy: 1—there are two and more stockholders and the share of one of them is more than 75 percent, 0—otherwise	BEEPS	(−)
Share25	Dummy: 1—the maximal share of each stockholder is less than 25 percent, 0—otherwise	BEEPS	(+) before crisis, (−) after crisis
Subsidies	Dummy: 1—if the firm received government subsidies during the last three years, 0—otherwise	BEEPS	(+)
Foreign_share_50	Dummy: 1—if foreigner share is more than 50 percent, 0—otherwise	BEEPS	(+) before the crisis, (−) after the crisis
Gov_share_50	Dummy: 1—if government share is more than 50 percent, 0—otherwise	BEEPS	(+)
Politicalstability	Political stability: −2,5—minimum, +2,5—maximum	World bank, worldwide governance indicators	(+)
Inflation	Inflation rate, percent	WorldBank	(−)
Gdpgrowth	Real GDP growth rate, percent	WorldBank	(+)
D_bankloans	Dummy: 1—if the value of bank credits is positive, 0—otherwise	BEEPS	(+)
Compete_informal	Dummy: 1—if the firm considers competition in informal sector as a serious obstacle, 0—otherwise	BEEPS	(−)
Retained_earnings	Percent of the value of fixed assets purchased by means of retained earnings	BEEPS	(−)
Dom_private_GDP	Domestic credit to private sector, percent of GDP	WorldBank	

the model. We strive to ensure that some variables would have an impact on the likelihood of disclosing information about sources of funding but would not affect the share of trade credits in fixed assets. This condition was considered by us when building models: in the target equation we consider the influence of internal factors only for SMEs, and in the selection equation, variables are analyzed without considering the size of the company. Also, to consider country specificities, both the target and the selective equations include country dummies.

The influence of internal factors for small and medium-sized firms is the same as for large companies. However, the paper implements the choice in favor of demonstrating the "cleaned" values of the coefficients of the internal indicators of firms, taking into account the stratification by size.

If for the two-step Heckman procedure, the significance of the lambda (Mills ratio) is not revealed, this does not allow us to judge the presence of bias estimates for trade credits due to the disclosure of information about the sources of funding. In this case, to interpret the influence of factors on the value of trade credits, we use the OLS method:

$$y_i = \delta X_i' + \nu_i, i \in \{1, \ldots, n\}, \quad (5)$$

where y_i is the share of trade credits in the fixed assets, X_i' are the determinants of the share of trade credits (Table 1), δ are the regression coefficients, i is the number of a company in our sample, ν_i is the random error, n is the number of observations.

4. Results

In order to perform a robustness check, we test the models on the full sample and the sample without Russia. We present the results for the full sample and the sample without Russia, separately, see Table 2 for the precrisis period and Table 3 for the postcrisis periods, respectively.

Tables 2 and 3 present the results of the calculations according to regression models that include various sets of factors. The choice of factors included in each model is based on the correlation coefficients to avoid the problem of multicollinearity. In Tables 2 and 3 Models 1–3 correspond to the full sample and Models 4 and 5 correspond to the sample without Russia.

Table 2: The results of testing hypotheses for the precrisis period.

Variables	The full sample						The sample without Russia			
	Model 1		Model 2		Model 3		Model 4		Model 5	
	Dependent variable:		Dependent variable:		Dependent variable:		Dependent variable:		Dependent variable:	
	Trade credits	Disclosure about finance sources	Trade credits	Disclosure about finance sources	Trade credits	Disclosure about finance sources	Trade credits	Disclosure about finance sources	Trade credits	Disclosure about finance sources
Obstacle to finance		0.003 (0.033)		0.054 (0.034)		0.003 (0.032)		0.0599 (0.0402)		0.0597 (0.0402)
Obstacle to_finance_sme	0.479 (0.435)		−0.248 (0.442)		0.588 (0.429)		−0.0402 (0.033)		−0.051* (0.0326)	
Share100		0.014 (0.028)					0.0389 (0.0337)			
Share100_ sme	−1.316*** (0.333)						−0.07*** (0.0254)			
Share75				−0.017 (0.056)						
Share75_ sme			−0.519 (0.768)							
Share25						−0.046 (0.062)				−0.0442 (0.0771)
Share25_ sme					2.509*** (0.885)				0.21*** (0.0736)	
Subsidies_ sme	−0.186 (0.699)		−0.213 (0.675)		−0.369 (0.688)		−0.0432 (0.0517)		−0.0446 (0.0517)	
Foreign_ share_50	1.113** (0.469)		1.35*** (0.453)		0.61 (0.464)		0.0636* (0.0363)		0.077** (0.0361)	
Gov_ share _50		−0.41*** (0.043)		−0.362*** (0.044)		−0.423*** (0.042)		−0.49*** (0.0526)		−0.48*** (0.0519)
Sme		−0.28*** (0.036)			−0.383 (0.416)	−0.282*** (0.035)		−0.35*** (0.0437)		−0.35*** (0.0433)
Age				0.003*** (0.001)			−0.0207 (0.0166)		−0.0148 (0.0163	
Age_sme			0.024 (0.015)							
Gdp growth	−0.032 (0.029)	0.025*** (0.002)		0.025*** (0.002)		0.026*** (0.002)	0.0028 (0.0023)		0.0017 (0.0023)	
Political stability		0.432*** (0.084)		0.448*** (0.084)		0.454*** (0.084)				
Inflation			−0.111** (0.049)		0.022(0.052)					
D_bank loans					2.41*** (0.371)		0.160*** (0.0288)		0.17*** (0.0287)	
Retained_earnings							−0.22*** (0.0333)		−0.22*** (0.0333)	
Dom_private_GDP								0.013*** (0.0039)		0.01*** (0.0038)
Const	−3.123 (2.466)	0.071 (0.1)	−5.37*** (1.865)	−0.202** (0.096)	−1.874 (1.734)	0.09 (0.1)	0.0634 (0.1719)	−0.41*** (0.0878)	0.1155 (0.1717)	−0.39*** (0.0885)
Country effects	Yes		Yes		Yes		Yes		Yes	
Wald	112.42***		84.72***		132.77***		182.53		183.95	
Obs	10522		9984		10507		7357		7357	

***significant at the 1% level, **significant at the 5% level, *significant at the 10% level. Note: in Table 2 models 1, 2 and 3 are based on the full sample, and models 4 and 5 are based on the sample without Russia. All the models are Heckman models, where *trade credit*s is the main dependent variable, and *disclosure about finance source* is the second dependent variable. The choice of factors to be included in the models is based on the correlation matrix. For each factor, the numbers without brackets are the regression coefficients, the numbers in brackets are the standard errors.

Table 3: The results of testing hypotheses for the postcrisis period.

Variables	The full sample			The sample without Russia			
	Model 1	Model 2	Model 3	Model 4		Model 5	
		Dependent variable:		Dependent variable:		Dependent variable:	
		Trade credits		Trade credits	Disclosure about finance sources	Trade credits	Disclosure about finance sources
Obstacle to finance_big						0,3658*** (0,1281)	
Obstacle to finance_sme	0.658 (0.672)	0.765 (0.662)	0.781 (0.672)	0.0991* (0.0614)			
Share100_sme	0.723* (0.511)						
Share75					0.0336 (0.0572)		
Share75_sme		−2.073* (1.093)		−0.1999** (0.0861)			
Share25							−0.0636 (0.113)
Share25_big						0.1524 (0.2523)	
Share25_sme			−0.565 (2.072)				
Subsidies_sme	2.627*** (0.911)	2.628*** (0.908)	2.656*** (0.905)	0.1711** (0.069)			
Subsidies_big						−0.0628 (0.1152)	
Foreign_share_50	−2.601*** (1.005)	−2.643*** (1.002)	−2.616*** (1.002)	−0.1961*** (0.0739)		−0.2045*** (0.0739)	
Gov_share_50					−0.344** (0.1575)		−0.3359** (0.157)
Compete_ informal	−0.104 (0.819)						
Sme			−0.624 (0.68)		−0.4134*** (0.0451)		−0.4166*** (0.045)
Age_sme	−0.05* (0.026)	−0.038 (0.026)					
Ln_age				−0.053* (0.031)		−0.0545* (0.0311)	
Inflation		0.298 (0.267)	0.321 (0.266)				
Dom_private_GDP					−0.0049*** (0.0018)		−0.0049*** (0.0018)
Gdpgrowth				0.0058 (0.0053)	−0.0127*** (0.0037)	0.0043 (0.0052)	−0.0126*** (0.0037)
Gdpgrowth* compete_ informal				−0.0008 (0.003)		−0.0005 (0.003)	
D_bankloans	−0.151 (0.583)			0.0697 (0.0482)		0.079 (0.0482)	
Retained_earnings				−0.3669*** (0.0634)		−0.3601*** (0.0635)	
Const	2.401* (1.373)	2.784** (1.352)	2.942** (1.446)	0.8939*** (0.2297)	0.3044*** (0.1005)	0.6587*** (0.2462)	0.3101***(0.1005)
Country effects	Yes	Yes	Yes	Yes		Yes	
R^2	0.0317	0.032	0.031	—		—	
Wald		—		178.67		176.22	
Number of obs	10 657	10 657	10 657	6968		6968	

***significant at the 1% level, **significant at the 5% level, *significant at the 10% level. Note: in Table 3 models 1, 2 and 3 are based on the full sample, and models 4 and 5 are based on the sample without Russia. Models 1, 2 and 3 are OLS models and include the only dependent variable *trade credits*. Using of OLS models is due to the fact that Heckman models are inapplicable for the case of the full sample and the postcrisis period (the significance of the lambda parameter was not revealed). Models 4 and 5 are Heckman models, where *trade credit*s is the main dependent variable, and *disclosure about finance source* is the second dependent variable. The choice of factors to be included in the models is based on the correlation matrix. For each factor, the numbers without brackets are the regression coefficients, the numbers in brackets are the standard errors.

The Heckman model captures the sample bias of firm responses in the BEEPS survey, so we pay some attention to the patterns associated with the disclosure of information in this survey.

4.1. Determinants of the Information Disclosure on the Funding Sources in the BEEPS Survey. First, we consider the factors determining the second dependent variable: *disclosure on the funding sources* (Table 2). We find that in the precrisis period companies in countries with more favorable macroeconomic conjecture and institutional environment are more likely to disclose information on the sources of funding in the BEEPS survey (Table 2). As shown in Table 2, the more solid political stability (the *political_stability* variable) and the higher GDP growth rate (*gdp_growth*), the greater disclosure on the funding sources (both factors are significant at the 1% level, see Models 1, 2, and 3). The more elevated level of domestic credit to GDP (*dom_private_GDP*), the greater disclosure on the funding sources (the factor is significant at the 1% level, see Models 4 and 5 in Table 2).

Our results show that after the crisis, in countries with higher GDP growth rate, higher inflation and higher domestic credit to private sector, the business model of companies is built on less information disclosure (Table 3). The higher GDP growth rate (*gdp_growth*) and the domestic credit to private sector (*dom_private_GDP*), the weaker information disclosure (the both factors are significant at the 1% level; Table 3, Models 4 and 5). The impact of inflation rate (*inflation*) is positive, but the statistical significance is not high (Table 3, Models 1 and 2). Our explanation is that after the crisis, the GDP growth rate in most emerging markets decreased, while the domestic credit to private sector increased in 1.5–2.5 times for the major part of considered countries. The soft monetary policy of most countries in the postcrisis period led to a decrease in inflation (we consider the period before 2021) and a reduction of inflation dispersion among countries. Without a pronounced global economic growth, the motivation for disclosing information disappeared. But in emerging countries with deteriorating macroeconomic conditions companies tried to gain competitive advantages by disclosing information.

In both sub-periods, if a company is either small or medium (the *sme* variable), the information disclosure decreases (the factor is significant at the 1% level; see Table 2, Models 1, 3–5, and Table 3, Models 4, 5). We explain this by the greater non-openness of SMEs. For companies with state participation in the equity capital of over 50 percent (the *gov_share_50* variable), the management tends to decrease the information disclosure on sources of funding in the BEEPs survey (the factor is significant at the 5% level; Table 2, Models 1–5, and Table 3, Models 4 and 5). For companies with state participation, this result corresponds to the findings by Choi et al. [30] on the positive influence of the state share in the structure of equity capital on the presence of information asymmetry.

In the precrisis period, an important factor is the age of company (the *age* variable). The older the firm, the greater is the propensity to disclose information about sources of funding in the BEEPS survey (the factor is significant at the 1% level; Table 2, Model 2). We explain it by the fact that movement through the company's life cycle encourages companies to be more open. The quality of business management is improving, and there is less competition risk and risks associated with information disclosure. This result corresponds to the conclusion of Andrieu et al. [5] on strengthening the problem of information asymmetry for companies with a smaller age.

In the postcrisis period, a lower probability of information disclosure is observed if the maximal share of each stockholder in the equity capital is less than 25 percent (the direction of impact of the *share25* variable is negative, but the statistical significance is not high, Table 3, Model 5). We explain this by the fact that, with a dispersed structure of equity capital, there is a higher risk of agency conflicts, and the companies do not intend to smooth information asymmetry risks. On the contrary, if there is an owner with the share of 75% in the equity capital, information disclosure increases (the direction of impact of the *share75* variable is positive, but the statistical significance in not high, Table 3, Model 4).

In the precrisis period, if a company evaluates access to finance as a serious obstacle, then the managers prefer to disclose more information about sources of funding in the BEEPS survey (the direction of influence of the *obstacle_to_finance* variable is positive, but the significance is not high, Table 3, Models 1–5). We explain it by the fact that such firms strive to become more transparent for counterparties and attract more trade credits.

4.2. Determinants of Trade Credits Attractiveness to Finance the Purchase of Fixed Assets. This subsection deals with the factors that significantly affect the share of trade credits in fixed assets (hereinafter referred to as the value of trade credits). It is worth noting that when testing the two-step Heckman procedure for the full sample over the postcrisis period (Table 3), the significance of the lambda was not revealed, which does not allow us to judge the presence of bias estimates for trade credits due to the disclosure of information about the sources of funding. Therefore, to interpret the influence of factors on the value of trade credits in the postcrisis period, model specifications are estimated using the least squares method (Table 3). But for the sample without Russia there is a problem of sample bias, and Heckman models are valid (Table 3).

In the precrisis period, for SMEs, the sole owner has a negative impact on the value of trade credits (the *share100_sme* variable is significant at the 1% level, Table 2, Models 1 and 4), however, in the postcrisis period, a positive effect is revealed (the factor is significant at the 10% level, Table 3, Model 1). Our interpretation is that, if the company has a sole owner, then he/she is most likely an entrepreneur. Before the crisis, suppliers assessed the risks of providing a trade credit to a sole entrepreneur as high, given the lack of a counterweight system and the possibility of investing the funds received in high-risk investment projects. After the

crisis, the inflation rates and the cost of debt financing decreased (we consider the period before 2021), growth rates of the economy decreased, competition in the national markets of most emerging countries increased, both for the companies and for the suppliers, and the informational transparency of the companies increased due to the development of Internet technologies. Under the conditions of a changed macroeconomic environment and under the pressure of competition, suppliers began to reevaluate the risks of SMEs with the sole owner and the share of trade credits in fixed assets increased.

We explain the situation when a package of 75 percent or more (but less than 100 percent; the *share75_sme* variable) of a company's shares is owned by one stockholder by the presence of an institutional investor (for example, a direct investment fund when attracting external equity capital, or a lender when a loan is not repaid). Before the crisis, the impact of such an ownership structure on the provision of trade credits was negative, although the statistical significance was low (Table 2, Model 2). After the crisis, the influence remained negative, but became significant at the level of 10% (Table 3, Models 2 and 4). We explain this by the fact, that after the crisis, the suppliers began to pay more attention to the presence of the institutional (possibly new) owner, regarding its presence as a signal of a potential conflict of interests of the owners or of the unfavorable financial position of the company.

Before the crisis, the share of trade credits in SME fixed assets was significantly positively affected by the distributed ownership structure, when the share of each shareholder did not exceed 25 percent (the *share25_sme* variable is significant at the 1% level; Table 2, Models 2 and 5). After the crisis, the direction of influence of this factor is negative and statistical significance is not high (Table 3, Model 3).

In the precrisis period, with the availability of bank loans among the sources of financing, there is a greater share of trade credits, i.e. bank and trade credits are complementary funding sources (the *d_bank_loans* variable is significant at the 1% level, Table 2, Models 3–5). A similar conclusion was obtained by Andrieu et al. [5]. But after the crisis the influence of this variable is instable and not significant (Table 3, Models 1, 4 and 5).

The change of direction of influence is observed in relation to the variable of presence of the foreign owner in the equity capital (*foreign_share_50*). If the share of foreign capital is more than 50 percent, a higher value of trade credits is observed in the precrisis period (the factor is significant at the 5% level, Table 2, Models 1, 2, 5) while a lower one is in the postcrisis time (the factor is significant at the 1% level, Table 3, Models 1–5). The change in the direction of influence of this factor can be explained by the behavior of foreign capital in a crisis. In many countries, foreign companies left the market in a crisis, lost their counterparties, and trust in them fell.

In the postcrisis period, if the SME received state subsidies in the last three years, there is a higher value of trade credits (the *subsidies_sme* variable is significant at the 1% level, Table 3, Models 1–4). We explain the emergence of the significance of this factor after the crisis by the paternalistic moods. After the crisis, the state began to intervene more in the economy, to influence many processes, and government subsidies became a significant factor in solving the financial problems of companies against the background of relatively low economic growth rates. Such effect is not observed for big companies (the *subsidies_big* variable, Table 3, Model 5).

The hypothesis was confirmed that the degree of use of trade credits depends on inflation. Expensive money narrows the possibilities of trade crediting. In the precrisis period, it was revealed that the higher the inflation rate, the lower is the share of trade credits (the *inflation* variable is significant at the 5% level, Table 2, Model 2). For the postcrisis period, when many countries pursued a policy of Quantitative easing, the impact of inflation has decreased, but was still positive (Table 3, Models 2 and 3). The reduction in the cost of money eased restrictions on access to trade credits.

Our study does not statistically confirm the hypothesis that, in the precrisis period, SMEs are characterized, on average, by a lower level of trade credits, compared to large firms (Table 2, Model 3: the impact of the *sme* variable is negative, but statistical significance is not great). We explain this by increasing the problem of information asymmetry for small companies [5, 11].

The influence of real GDP growth (the *gdp growth* variable) on trade credits is positive for both periods, but the statistical significance is not high (Table 2, Models 4 and 5, Table 3, Models 4 and 5). This result is in line with Carbó-Valverde et al. [9]; who showed that the GDP growth rate positively affects the demand of firms for financing. The multiplicative variable based on GDP growth (*gdpgrowth* compete_informal*) is insignificant in the postcrisis period (Table 3, Models 4 and 5). We conclude that in the postcrisis period, suppliers have reevaluated risks and other factors have become of greater importance for them.

The influence of company's age has dramatically changed: in the precrisis period more trade credits were given to older firms (the age_sme variable, Table 2, Model 2), which is in accordance with [5, 19, 22]. After the crisis, more trade credits are given to younger firms (the *age_sme* and *ln_age* variables, Table 3, Models 1, 2, 4, 5). For almost all models statistical significance of age factor in the postcrisis period becomes low. We explain this by tightening of banks' credit policy. Banks began to lend loans only to trusted borrowers with a good credit history. Venture financing is not developed in the emerging markets under consideration. Younger firms, especially startups, focused on more expensive trade credits. Older companies have a more diversified structure of financing sources.

Percent of purchases of fixed assets finance by retained earnings significantly (at 1% level) decreases the value of trade credits (the *retained_earnings* variable, Tables 2 and 3, Models 4 and 5). We conclude that retained earnings and trade credits are substituting funding sources.

If a big firm have a serious obstacle to finance, it uses more trade credits for purchases of fixed assets (the *obstacle to finance_big* variable is significant at the 1% level, Table 3, Model 5). This result coincides with the findings of Carbó-Valverde et al. [9] who underlined the important role of

trade credits as an external financing source. But for SMEs influence of obstacle to finance (the *obstacle to_finance_sme* variable) changes direction and significance is not high (Table 2, Models 1–3, Table 3, Models 1–3).

The results for the full sample and the sample without Russia are stable (Tables 2 and 3, Models 4 and 5 for the sample without Russia, Models 1–3 for the full sample).

5. Conclusion

In this paper, for the first time, we analyze the motivation for using trade credits to finance the purchase of fixed assets. The originality of our research is in the fact that we shed light on making of such a decision by SMEs and identify the main determinants of management motivation. Previous research addresses general determinants of the total value of trade credits or specifically focuses on trade credits for financing solely working capital. We focus on an alternative target for such a short-term financing source as trade credits.

We consider a specific sample of SMEs from emerging countries of the Eastern bloc, which includes more than 20 thousand observations. Our study is based on the unique World Bank survey data, which gives a possibility to assess the managers' perception of business conditions. In order to eliminate the bias in the answers, related to the fact that not all SMEs disclose full information, we apply an original methodology—the two-step procedure of Heckman, which allows us to solve the problem of selectivity of the sample. We compare the results of econometric calculations for two subperiods—before and after the GFC of 2008–2009.

Our results show that if the company is a SME, with state participation in the capital of over 50 percent, there is a decrease in the probability that the company will disclose information on sources of funding. We conclude that SMEs with state participation are more closed.

Our study allows us to range determinants of trade credits used for purchase of fixed assets by statistical significance. Before the GFC, the most significant determinants are: concentration of the equity capital (and especially the presence of the sole owner), raising bank loans, use of retained earnings for purchase of fixed assets. These key determinants are followed by the share of foreign ownership and inflation. After the crisis, the list of most significant determinants' changes, they are: the share of foreign ownership, state subsidies and retained earnings for purchase of fixed assets. Other significant determinants are equity concentration and firm age.

We have obtained original conclusions on the impact of the structure and concentration of equity capital on the share of trade credits in fixed assets. If the company has a sole owner, the motivation in management decisions changes: in the precrisis period, the value of trade credits decreases, and in the postcrisis period it increases. Before the crisis, the share of trade credits is significantly positively affected by the diversified structure of equity capital. We explain this by the change in the macroeconomic environment and the priorities of risk assessment by suppliers in the postcrisis period. In the both periods, if the stake of 75 percent or more (but less than 100 percent) of the company's shares belongs to one owner, the value of trade credits decreases.

For firms with foreign participation in equity capital, the business model assumes a higher value of trade credits in the precrisis period and a lower one in the postcrisis time. We explain this by the change in trust to foreign companies from the national suppliers after the crisis. If SMEs are provided with government subsidies, then, in the postcrisis period there is a higher value of trade credits. The role of firm's age also changes: in the precrisis period, more trade credits are given to older firms, but after the crisis, more trade credits are given to younger firms.

An original conclusion of our paper is that during both, the pre- and postcrisis periods, bank loans and trade credits are complementary sources of financing. On the contrary, retained earnings and trade credits are substituting funding sources.

Statistical analysis of the BEEPS survey database shows that trade credits and bank loans are the two most important sources of financing for SMEs. In order to develop the SMEs segment, we suggest conducting a pro-active policy toward promoting insurance mechanisms on trade credits and stimulating large suppliers to work with SMEs.

Our research leads to the following business policy implications. First, we evidence that the problem of information asymmetry discourages suppliers from financing SMEs. To remove financial constraints, it is necessary to increase information transparency of SMEs, to promote initiatives on collecting history of financial statements and equity structure of SMEs, to implement best practices of corporate government from the developed countries. As a result, a low level of information asymmetry can reduce the capital costs. Second, we reveal that receiving government subsidies facilitates the access of SMEs to trade credits. So, there should be mechanisms of government support for SMEs, especially during the periods of financial crises. Third, our results show that after the crisis SMEs with one owner attract more trade credits. We consider the sole owner as an entrepreneur. So, we recommend supporting entrepreneurship and protecting property rights.

The key limitation of our study is that the survey data contain few quantitative variables and a lot of dummy variables. So, one of possible directions of the future work is considering of a wider spectrum of quantitative variables, for example, financial indicators of firms. Another possible direction of the future work is analyzing the influence of ESG factors. The third direction is analyzing the influence of the pandemic of the COVID-19.

Wrapping-up, the results of our study are potentially useful for both, the SMEs for better understanding of business environment and for the regulators for development and promoting policies capable of increasing effectiveness of SMEs business activities [31].

Data Availability

The data used to support the findings of this study are provided upon request.

Disclosure

The article was prepared within the framework of the Basic Research program at HSE University.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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