Capital Structure and Firm Performance: The Case of Central and Eastern European Economies

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Abstract

The current study examines the relationship between capital structure and firm performance for a sample of non-financial firms from eight Central and Eastern European countries in the period 2008 – 2017. Based on the agency costs hypothesis, we investigate whether debt ratio as a proxy for capital structure has a positive relationship with firm performance for the countries included in the sample. The results indicate a negative relationship between these variables and, thus, they did not support the agency costs hypothesis. In addition, we test the reverse causality from performance to capital structure based on two opposite hypotheses, that is, the efficiency-risk and the franchise-value hypothesis. The results support the franchise-value hypothesis, indicating a negative relationship between debt ratio and firm performance.

Keywords: *capital structure, debt ratio, franchise-value hypothesis, efficiency-risk hypothesis, firm performance, agency costs, CEE countries*

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Introduction

In the attempt to describe the relationship between capital structure and firm performance, Modigliani and Miller (1958) stated that the value of a firm does not depend on the firm's capital structure (i.e., the irrelevance theorem). There is a large body of evidence that firm's capital structure has an effect on its value,

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which indicates that a firm can change its performance and value by modifying the target ratio between equity and debt (Jensen and Meckling, 1976; Myers and Majluf, 1984; Harris and Raviv, 1991; De Miguel and Pindado, 2001; Huang and Ritter, 2009; for a review, see Myers, 2001).

One of the capital structure theories that explains how capital structure relates to firm performance is the *agency costs theory* (Jensen and Meckling, 1976). According to this theory, at the firm level may occur conflicts of interests between different categories of agents (e.g., managers, shareholders, debtholders), which can generate agency costs. There have been identified two types of conflicts, which have different effects on the relationship between capital structure and firm performance (Jensen, 1986; Jensen and Meckling, 1976; Margaritis and Psillaki, 2010; Myers, 2001). First, the manager-shareholder conflict arises because managers tend to pursue a series of private benefits (e.g., higher wages, additional earnings, job security) and do not invest effort to increase firm's value. In this case, shareholders monitor and control managers' performance, which may generate agency costs, such as performance bonuses (e.g., Ardalan, 2017; Jensen and Meckling, 1976).

A solution for the agency costs problems generated by manager-shareholder conflict is the increase of debt financing because this reduces the amount of money at the disposal of managers (Jensen, 1986; Berger and Bonaccorsi di Patti, 2006). A higher debt ratio leads to a reduction in the agency costs and an increase in firm performance because managers are constrained to act more closely in the line with the interests of shareholders and to avoid the costs of bankruptcy (Grossman and Hart, 1982; Margaritis and Psillaki, 2010). Thus, agency costs hypothesis states a positive association between debt ratio as a proxy of capital structure and firm performance (Berger and Bonaccorsi di Patti, 2006; Coricelli et al., 2011; Detthamronga et al., 2017).

Second, the shareholder-debtholder conflict arises due to the high level of debt ratio, which can cause bankruptcy or financial distress as well as a decrease in firm performance (Jensen and Meckling, 1976; Margaritis and Psillaki, 2010). In particular, this type of conflict occurs because shareholders tend to exert actions for their own benefit at the cost of debtholders and thus they does not maximize firm's value (Weill, 2003). For example, shareholders tend to invest in higher-risk projects than debtholders because the losses do not affect them so much, as they are shared between debtholders and shareholders (Francis et al., 2022; Jensen and Meckling, 1976).

Research on the agency costs theory has produced mixed results. While some studies have found support for the agency costs hypothesis, indicating a positive association between capital structure and firm performance (Abdullah and Tursoy,

2019; Berger and Bonaccorsi di Patti, 2006; Coricelli et al., 2011; Detthamronga et al., 2017), other studies have revealed that capital structure has a negative effect on firm performance (Majumdar and Chhibber, 1999; Vinh Vo and Ellis, 2017; Vithessonthi and Tongurai, 2015; Weill, 2003).

The lack of consensus regarding the effects of capital structure on firm performance may be explained by the fact that studies used different proxies for firm performance and different estimation models (Berger and Bonaccorsi di Patti, 2006; Majumdar and Chhibber, 1999; Margaritis and Psillaki, 2007; Vinh Vo and Ellis, 2017; Vithessonthi and Tongurai, 2015). Another possible explanation may be related to the different institutional frameworks of the countries included in the studies investigating the relationship between capital structure and firms' performance. For example, Weill (2003) has found a positive relationship between capital structure and firm performance for France and Germany, but a negative relationship for Italy, which suggests that institutional characteristics of a country (e.g., the access of firms to banks, the efficiency of the legal system) might have an impact on this relationship.

Moreover, there is strong empirical evidence that macroeconomic factors (e.g., interest rate, inflation rate) influence firms' capital structure (Azofra et al., 2020). Thus, examining the relationship between capital structure and firm performance under different macroeconomic conditions, including the perspective of Central and Eastern European (CEE) countries is particularly important, given the differences in their economic development compared to the developed countries (Bokpin, 2009).

The current study addresses all these aspects by including in the analysis a sample of eight CEE countries, which are assumed to have similar capital structure (Booth et al., 2011). To our knowledge, no recent study has investigated the relationship between capital structure and firm performance in the CEE countries. The only study that has investigated this relationship was conducted by Coricelli et al. (2011) with data collected more than 10 years ago (1999 – 2008). Since then, the CEE countries have undergone a range of social, economic, and political changes (De Haas and Peeters, 2006). In the present study, the analysis of the capital structure-firm performance relationship in CEE countries was extended for another nine-year period, that is, from 2008 to 2017.

Furthermore, only a few studies investigating the association between capital structure and firm performance have focused on the reverse causality from performance to capital structure (Berger and Bonaccorsi di Patti, 2006; Margaritis and Psilallaki, 2007; Tsolas, 2021). To analyze this reverse causality, two opposite hypotheses have been proposed (Berger and Bonaccorsi di Patti, 2006), namely the *efficiency-risk hypothesis* and the *franchise-value hypothesis*. Whereas

the *efficiency-risk hypothesis* claims that highly performant firms have higher debt ratios, as higher performance decreases the costs of financial distress and bankruptcy, the *franchise-value hypothesis* asserts that highly performant firms have lower debt ratios, as they appear to hold extra equity capital in order to preserve their future profit (Berger and Bonaccorsi di Patti, 2006).

The few empirical studies that investigated the reverse causality from performance to capital structure have revealed mixed results (Berger and Bonaccorsi di Patti, 2006; Margaritis and Psilallaki, 2007; Tsolas, 2021). For example, Berger and Bonaccorsi di Patti (2006) found support for the efficiency-risk hypothesis for US banking industry, whereas Tsolas (2021) found support for the franchise-value hypothesis for the Greek firms. Margaritis and Psilallaki (2007) showed that both hypotheses might explain the relationship between firm performance and capital structure. Thus, it remains unclear which of these hypotheses explain the relationship between capital structure and firm performance in New Zealand.

Furthermore, to the best of our knowledge, no previous study has investigated the reverse causality relationship between firm performance and capital structure for the CEE countries, using both the efficiency-risk hypothesis and the franchise-value hypothesis (Berger and Bonaccorsi di Patti, 2006). The current study addresses this gap by investigating the reverse causality relationship between capital structure and firm performance for a sample of CEE countries. More specifically, the purpose of this study was to examine the relationship between capital structure and firm performance, as well as the reverse causality relationship for a sample of eight CEE countries, that is, Bulgaria, Czech Republic, Greece, Hungary, Slovak Republic, Slovenia, Poland, and Romania. These CEE countries have similar characteristics of their capital structure, such as low debt ratio and zero debt ratio (De Haas and Peeters, 2006). However, despite these similarities, the CEE countries included in this study are not homogeneous, as the institutional reform in each of them has progressed in varying ways and to different degrees (Coricelli et al., 2011). Given the unique characteristics of these CEE countries, we also aimed at investigating the degree to which the relationship between capital structure and firm performance varies between these countries.

In order to examine the relationship between capital structure and firm performance for CEE countries, two hypotheses were proposed.

Most of the capital structure theories (e.g., agency costs theory) and the empirical studies based on these theories that involve developed countries postulate a positive relationship between capital structure and firm performance (Abdullah and Tursoy, 2019; Berger and Bonaccorsi di Patti, 2006; Coricelli et al., 2011).

However, studies involving emerging economies (e.g., Greece, Thailand and Vietnam) have indicated a negative relationship between capital structure and firms' performance (Le and Phan, 2017; Vithessonthi and Tongurai, 2015). Therefore, we postulate that:

H1: *There is a negative relationship between debt ratio and firm performance of all CEE countries in the sample.*

They also assess the effect of firm efficiency on capital structure and investigated whether this effect is similar or not across different capital structure choices thereby tested the reverse causality efficiency-risk and franchise hypotheses. Tsolas (2011) founded support for franchise-value hypothesis, therefore we postulate that:

H2: *There is a negative effect of firm performance on capital structure in accordance with the franchise-value hypothesis.*

To test our hypotheses, we defined a two-equation model and estimated it using two-stage least squares (2SLS) method. For testing the agency costs hypothesis, an equation that specifies firm performance as a function of the firm's debt ratio and other control variables (i.e., firm size, tangibility, sales growth, liquidity) was used.

Moreover, to test which of the two hypotheses, that is, the efficiency-risk and the franchise-value hypothesis (Berger and Bonaccorsi di Patti, 2006) best describes the reverse causality from performance to capital structure, we used an equation specifying the debt ratio as a function of the lagged debt ratio, firm performance and the aforementioned control variables.

The structure of this paper is as follows: Section 1 presents the data collection and research methodology. In Section 2, we discuss the results of the models' estimation. Finally, Section 3 describes the conclusions with the implications of these findings.

1. Data and Methodology

The relationship between capital structure and firm performance was tested using firm-level data for a group of eight Central and Eastern European countries, collected from Bureau van Dijk's Amadeus database. More specifically, our sample consisted of 828 non-financial listed firms from Bulgaria (96), Czech Republic (64), Greece (198), Hungary (28), Slovak Republic (138), Slovenia (51), Poland (123), and Romania (130) over the period 2008 – 2017. It should be noted that we eliminated from the sample the financial firms because their balance sheets differ from those of non-financial firms, as well as the firms that had missing data for more than 3 consecutive years.

Firms' capital structure is characterized by debt ratio, which is computed as the ratio between debt and assets using both market and book values (Delcoure, 2007; De Haas and Peeters, 2006; De Miguel and Pindado, 2001).

Some authors (Hovakimian et al., 2001; Roberts, 2002) found that the use of market values or book values of debt do not significantly influence the relationship between debt ratio and determinants of debt ratio. Thus, in this study we calculated debt ratio (in percentage) as the ratio of total debt to total assets in book values (Chen, 2004; Delcoure, 2007). Table 1 presents the average debt ratios for each sample country.

T a b l e 1

Average Debt Ratio from 2008 to 2017

Country	No. of firms	Debt ratio (%)
Bulgaria	96	44.78
Czech Republic	64	39.75
Greece	198	63.41
Hungary	28	44.83
Poland	123	50.92
Romania	130	47.85
Slovak Republic	138	42.91
Slovenia	51	50.22

Source: Authors' calculation.

As shown in Table 1, the average debt ratios range between 39.75 in Czech Republic and 63.41 percent in Greece. These values are above the average debt ratios recorded for CEE countries in 1995, which ranged only between 20 and 40 percent (De Haas and Peeters, 2006). According to De Haas and Peeters (2006) firms in developing countries reach or have a higher debt ratio given the continuous development of the financial systems in these countries.

Various measures of firm performance have been used in the literature: from basic performance measures such as return on net worth (Majumdar and Chhibber, 1999), return on assets (Vithessonthi and Tongurai, 2015; Salim and Yadav, 2012), return on equity (Salim and Yadav, 2012), and Tobins'q ratio (Salim and Yadav, 2012) to more advanced measures such as data envelopment analysis (Berger and Bonaccorsi di Patti, 2006; Margaritis and Psilallaki, 2007) or Total Factor Productivity (Coricelli et al., 2011).

Based on the approaches suggested by Majumdar and Chhibber (1999) and Vithessonthi and Tongurai (2015), we measured firm performance as *return on assets* (ROA).

In order to define the model that describes the relationship between firm performance and capital structure, we controlled for some of the variables that have

been shown to influence firm performance, that is, firm size, tangibility, liquidity, and sales growth.

Firm size, measured as natural logarithm of net sales has been found to have both positive and negative effects on firm performance (Himmelberg et al., 1999; Frank and Goyal, 2003). A positive effect was found for larger firms, because they are more diverse, better managed and have more capacities and resources and, in consequence, they have a higher performance (Frank and Goyal, 2003). When managers have difficulties in controlling the efficiency of activities due to the large size of the firms, a negative effect has been found (Himmelberg et al., 1999).

Tangibility was measured as the ratio of fixed tangible assets to total assets of the firm (Rajan and Zingales, 1995; Frank and Goyal, 2003; Titman and Wessels, 1988). The effect of tangibility on firm performance has been shown to be positive, because more capital-intensive firms use better technology, and thus they are more likely to be performant (Margaritis and Psillaki, 2010).

Liquidity was measured as the ratio of cash to total current liabilities (Majumdar and Chhibber, 1999) and it is expected to have a positive association with firm performance, because greater liquidity reflects managers' ability to produce higher firm profits.

The last control variable is *sales growth*, measured as the percentage change in sales (Majumdar and Chhibber, 1999). Firms with high sales growth have the possibility to generate larger profit, therefore a positive association between sales growth and firm performance is expected.

The regression equation for the model of firm performance is:

$$ROA_{it} = a_0 + a_1 DR_{it} + a_2 Z_{it} + \mu_i + \varepsilon_{it} \tag{1}$$

where

ROA – the firm performance,
DR – debt ratio,
Z – a vector of control variables,
μ – a firm-specific effect,
ε – an error term.

To address the issue of endogeneity between firm performance and capital structure, we used the two-stage least square (2SLS) random estimator. We used random estimator since we have more firms than years and firm-specific effects are in this case independent and identically distributed random variables.

The same control variables (i.e., firm size, tangibility, liquidity, sales growth) were used to test the hypothesis regarding reverse causality from firm performance to capital structure.

We controlled for firm size because it has been found that larger firms are more likely to use debt to finance themselves (Diamond, 1991; Mazur, 2007; Rajan and Zingales, 1995). Larger firms have a better reputation as well as a lower likelihood of bankruptcy, and thus they can get debt more easily (Myers, 2003).

In addition, tangibility can be used as a collateral in the case of bankruptcy. As tangible assets provide a guarantee in the case of bankruptcy, a positive relationship between tangibility and firms' debt ratio is expected (Rajan and Zingales, 1995; Titman and Wessels, 1988). In emerging economies, tangible assets can be used as collateral in a lesser extend do to the underdeveloped and inefficient legal systems and illiquid secondary markets for firms' assets (Nivorozhkin, 2005). Thus, a negative relationship between tangibility and debt ratio is expected for firms in these emerging countries. According to the pecking order theory of capital structure (Myers and Majluf, 1984), firms with higher liquidity should use for their activities more internal financing sources than debt. Given the strong empirical support for this theoretical assumption, a negative relationship between liquidity and debt ratio is expected (Deesomsak et al., 2004; Mazur, 2007).

Sales growth is used as a proxy for growth opportunities. Firms with higher growth opportunities are more valued by the banks and therefore they can get debt more easily (Chen, 2004). Thus, we expect a positive relationship between growth opportunities and debt ratio. Table 2 presents the control variables used in this study, their definition and their expected relationship with firm performance and debt ratio.

T a b l e 2

Definitions of the Control Variables and Their Expected Relationship with Dependent Variables

Variable	Measurement	Expected sign with firm performance	Expected sign with debt ratio
Firm size	natural logarithm of net sales	+	+
Tangibility	the ratio of fixed tangible assets to total assets	+	–
Liquidity	the ratio of cash to total current liabilities	+	–
Sales growth	the percentage change in sales	+	+

Source: Own source.

The final regression equation for capital structure is as follows:

$$DR_{it} = b_0 + b_1 DR_{it-1} + b_2 ROA_{it} + b_3 Z_{it} + \mu_i + \varepsilon_{it} \quad (2)$$

where

DR_{it-1} – the lagged value of the debt ratio,
ROA – the firm performance,
Z – a vector of control variables,
μ – a firm-specific effect,
ε – an error term.

As it has been previously found that firms in emerging countries have adjustment behaviour to the optimal capital structure (de Haas and Peeters, 2006; Nivorozhkin, 2005), we used a dynamic panel data model to test the reverse causality from firm performance to capital structure. In addition, due to the presence of lagged dependent variable (i.e., debt ratio), the model (2) was estimated using the two-stage least square (2SLS) first-differenced estimator. It should be mentioned that we estimated both models using panel VAR approaches. However, because the results of these estimations indicated no lead-lag relationship between capital structure and firm performance, we kept our initial estimated models.

For checking the robustness of the models, we first used another measure for firm performance, namely return on equity (ROE) and for debt ratio, namely short-term debt ratio (*STDR*). Second, we included in both models a new variable, that is, *board size* (*BS*) to check whether this variable has an influence on the relationship between firm performance and capital structure.

The inclusion of this new variable in the models is based on the assumptions of the corporate governance theory (La Rocca, 2007), according to which corporate governance variables mediate the relationship between capital structure and firm performance. Board size represents one of the corporate governance variables and was measured in this study as log of number of directors in the board of the firms (Wen et al., 2002).

2. Empirical Results

2.1. Results for the Firm Performance Model

The estimation results of model (1), using two-stage least square (2SLS) random estimator, are presented in Table 3.

As can be seen in Table 3, the coefficient for *DR* is negative and statistically significant for all countries included in the sample. The model for Hungary was not valid and this may be explained by the small number of firms included in the Hungarian sample (28 firms). For this reason, we excluded Hungary from the sample. The negative effect of capital structure on leverage suggests that the

financial distress costs exceed the benefits of debt, and that the performance of high leverage firms is significantly lower than the performance of their competitors (Berger and Bonaccorsi di Patti, 2006). Thus, *H1* was supported.

T a b l e 3

Results of the Estimation for the Firm Performance (ROA) Model

Country	DR	Size	Tang	Liquidity	Sales Growth	R^2	Wald	Obs.
Bulgaria	–0.083*** (0.016)	1.238*** (0.17)	–4.817*** (1.52)	0.028 (0.075)	0.017 (0.057)	0.108	85.58***	711
Czech Republic	–0.113*** (0.032)	–0.304 (0.247)	–9.921*** (2.342)	–0.103 (0.152)	1.298*** (0.386)	0.067	37.74***	536
Greece	–0.067*** (0.013)	0.418*** (0.084)	–2.273** (1.125)	0.287* (0.148)	0.132 (0.177)	0.055	77.63***	1335
Poland	–0.115*** (0.017)	0.281** (0.111)	–0.396 (1.373)	0.717** (0.287)	–0.006 (0.026)	0.083	91.81***	1026
Romania	–0.068*** (0.01)	0.133 (0.132)	–7.822*** (1.012)	–0.057 (0.045)	0.584*** (0.130)	0.092	110.77***	1101
Slovak Republic	–0.063* (0.036)	1.553*** (0.391)	0.976 (3.376)	0.069 (0.174)	0.306* (0.168)	0.018	19.81***	1092
Slovenia	–0.152*** (0.025)	0.495** (0.215)	0.241 (1.942)	0.492 (0.332)	11.434*** (2.007)	0.249	123.20***	377
All countries	–0.07*** (0.008)	0.473*** (0.065)	–4.064*** (0.735)	–0.02 (0.044)	0.06* (0.03)	0.03	164.48***	6435

Notes: Standard errors in brackets. *, **, *** denote significance at the 10%, 5% and 1% levels, respectively. The Wald test indicates the overall significance of the model.
DR – debt ratio, *Tang* – tangibility, *Size* – company size.

Source: Authors' calculation.

Moreover, the results of the model estimation indicated that the correlation between firm performance and firm size is positive and statistically significant for all countries, except for Czech Republic and Romania. These results suggest that, with few exceptions (firms from Romania and Czech Republic) larger firms are more diversified, have more capacities and resources and, in consequence, can be better managed and can have a higher performance (Frank and Goyal, 2003).

Regarding the correlation between tangibility and firm performance, a negative and statistically significant correlation was found for Bulgaria, Czech Republic, Greece, and Romania. The correlation was not significant for Poland, Slovak Republic, and Slovenia. The negative relationship between tangibility and firm performance can be explained by the treasury management, according to which high tangibility of assets indicates a lower working capital and, consequently a lower treasury management.

Therefore, if we consider that treasury management reflects the managerial ability to lead a company, it can be stated that tangibility of assets should be negatively linked to performance (Weill, 2003).

Concerning the relationship between liquidity and firm performance, a positive statistically significant correlation was found only for Greece and Poland. Therefore, we can conclude that overall liquidity is not an influential factor for firm performance.

Finally, the correlation between sales growth and firm performance is positive and significant for all countries, except for Bulgaria, Greece, and Poland. This result suggests that in the majority of the CEE countries, firms with high sales growth have the possibility to generate larger profit and, consequently obtain high performance.

2.2. Results for the Capital Structure Model

The estimation results of model (2), using two-stage least square (2SLS) first-differenced estimator, are presented in Table 4.

T a b l e 4

Results of the Estimation for the Debt Ratio (*DR*) Model

Country	DR_{it-1}	ROA	Size	Tang	Liquidity	Sales Growth	R^2	Wald	Obs.
Bulgaria	0.006 (0.04)	–0.268*** (0.04)	–0.040 (0.735)	–12.575*** (4.405)	–0.475*** (0.082)	0.034 (0.043)	0.098	90.88***	572
Czech Republic	0.154*** (0.044)	–0.205*** (0.036)	2.615** (1.172)	–21.101*** (5.992)	–0.469*** (0.142)	0.196 (0.233)	0.02	66.54***	427
Greece	0.29*** (0.02)	–0.366*** (0.056)	0.634*** (0.204)	–1.284 (2.099)	–3.995*** (0.236)	–0.151 (0.114)	0.136	938.45***	1264
Poland	0.118*** (0.029)	–0.329*** (0.025)	1.697 (1.152)	–11.328** (4.756)	–5.059*** (0.306)	1.208* (0.627)	0.439	462.87***	807
Romania	0.073*** (0.025)	–0.5*** (0.042)	2.233** (0.921)	–48.623*** (3.443)	–0.501*** (0.055)	–0.224 (0.143)	0.192	348.69***	878
Slovak Republic	0.405*** (0.024)	–0.049** (0.023)	1.86*** (0.565)	0.174 (2.916)	–1.56*** (0.143)	–0.059 (0.123)	0.09	543.74***	1031
Slovenia	0.221*** (0.047)	–0.385*** (0.046)	5.208** (2.345)	–16.82*** (5.2)	–1.113*** (0.283)	7.437*** (1.746)	0.286	118.81***	303
All countries	0.029** (0.012)	–0.126*** (0.013)	1.388*** (0.369)	–10.338*** (2.053)	–0.433*** (0.046)	0.008 (0.03)	0.03	228.18***	6161

Notes: Standard errors in brackets. *, **, *** denote significance at the 10%, 5% and 1% levels, respectively. The Wald test indicates the overall significance of the model.
DR – debt ratio, *Tang* – tangibility, *Size* – company size.

Source: Authors' calculation.

As can be seen in Table 4, the coefficient for ROA is negative and statistically significant in all countries from the sample, which is in accordance with the franchise-value hypothesis and supports *H2*. (Berger and Bonaccorsi di Patti, 2006). These results indicate that firms from CEE countries try to preserve the income from high profit efficiency by retaining additional equity capital (Berger and Bonaccorsi di Patti, 2006). In addition, the positive and statistically significant

coefficients for the lagged value of the debt ratio indicate the presence of an adjustment behavior to the target debt ratio in all countries from the sample, except for Bulgaria. Furthermore, the adjustment speed to the target debt ratio ($1 - b_1$) was very high for the CEE countries included in the sample.

Regarding the correlation between capital structure and control variables, as can be seen in Table 4, the coefficient for firm size is positive and statistically significant in all countries, except for Bulgaria and Poland. These results are in line with the previous findings for emerging countries, according to which larger firms obtain debt more easily, because they are perceived by the creditors as being more stable (Nivorozhkin, 2005; Delcoure, 2007).

The coefficient for tangibility is negative and statistically significant in all countries, except for Greece and Slovak Republic. These results are also in line with the previous findings for emerging countries that tangible assets represent poor sources of collateral in the case of bankruptcy (Nivorozhkin, 2005; Brendea, 2014).

Concerning the correlation between liquidity and debt ratio, this is negative and statistically significant for all countries from the sample. This result suggests that firms from CEE countries, which have higher liquidity use more internal sources than debt in order to finance their activities (Deesomsak et al., 2004; Mazur, 2007).

The coefficient for sales growth is significant only in Poland and Slovenia and, therefore, sales growth is not an influence factor for debt ratio.

2.3. Results from Robustness Tests

To check whether the results concerning the relationship between capital structure and firm performance are robust, first, we used another proxy for firm performance, that is, *return on equity*. Thus, we estimated the model (1) with two-stage least square (2SLS) random estimator using ROE as a measure for firm performance instead of *ROA*. The results of the estimation are presented in Table 5.

As can be seen in Table 5, the coefficients for debt ratio are negative and statistically significant in all countries from our sample. In addition, the results for the control variables are similar with the results when we estimated the model with *ROA* as dependent variable (see Table 3).

To check whether the results regarding the relationship between capital structure and firm performance are robust to changes in model specifications, we estimated model (1) with *board size* as an additional explanatory variable. As can be noted in Table 6, the introduction of the new variable did not significantly change the results of the estimation of the model (1).

T a b l e 5

Results of the Estimation for the Firm Performance (ROE) Model

Country	DR	Size	Tang	Liquidity	Sales Growth	R^2	Wald	Obs.
Bulgaria	–0.736*** (0.087)	4.590*** (0.899)	–35.725*** (8.068)	–0.456 (0.396)	–0.034 (0.304)	0.137	112.86***	711
Czech Republic	–0.546*** (0.093)	–0.595 (0.706)	–25.571*** (6.703)	–0.831* (0.435)	2.298*** (1.106)	0.079	45.46***	536
Greece	–0.263*** (0.054)	1.294*** (0.48)	–0.661 (6.415)	1.807* (0.968)	0.128 (0.29)	0.029	47.79***	1629
Poland	–0.216*** (0.066)	–0.311 (0.434)	5.274 (5.362)	0.570 (0.121)	–0.003 (0.1)	0.019	19.46***	1026
Romania	–0.143*** (0.035)	–0.370 (0.452)	–12.408*** (3.464)	–0.166 (0.155)	0.920** (0.445)	0.028	31.54***	1100
Slovak Republic	–0.682*** (0.096)	3.593*** (1.046)	11.345 (9.022)	–0.02 (0.465)	0.642 (0.449)	0.053	60.51***	1092
Slovenia	–0.365*** (0.079)	1.225* (0.690)	4.371 (6.246)	0.434 (1.071)	34.443*** (6.568)	0.158	69.49***	377
All countries	–0.351*** (0.025)	0.969*** (0.218)	–10.267*** (2.541)	–0.206 (0.154)	0.06* (0.03)	0.036	252.40***	6728

Notes: Standard errors in brackets. *, **, *** denote significance at the 10%, 5% and 1% levels, respectively. The Wald test indicates the overall significance of the model.
DR – debt ratio, *Tang* – tangibility, *Size* – company size.

Source: Authors' calculation.

T a b l e 6

Results of the Estimation for the Firm Performance (*ROA*) Model Having *Board Size* as an Additional Variable

Country	DR	Size	Tang	Liquidity	Sales Growth	Board size	R^2	Wald	Obs.
Bulgaria	–0.118*** (0.021)	1.353*** (0.26)	–4.824** (2.027)	–0.031 (0.06)	–0.025 (0.053)	–0.014 (1.002)	0.113	62.10***	749
Czech Republic	–0.16*** (0.041)	0.183 (0.437)	–13.291*** (3.638)	–0.053 (0.214)	0.864*** (0.321)	0.460 (0.935)	0.057	35.25***	509
Greece	–0.018*** (0.021)	0.403** (0.185)	–3.319 (2.115)	0.751*** (0.226)	0.017 (0.042)	2.081 (1.452)	0.046	31.14***	1447
Poland	–0.185*** (0.022)	0.353* (0.183)	–5.226** (2.062)	–0.702** (0.356)	–0.001 (0.023)	–1.7.39*** (0.524)	0.081	83.85***	1009
Romania	–0.123*** (0.013)	0.668*** (0.227)	–11.361*** (1.426)	–0.03 (0.043)	0.325*** (0.108)	–1.082* (0.632)	0.089	157.84***	1067
Slovak Republic	–0.14** (0.073)	3.301*** (1.278)	–21.264*** (7.41)	–0.256 (0.201)	0.065 (0.171)	–1.993 (1.308)	0.015	30.57***	1031
Slovenia	–0.176*** (0.026)	0.414 (0.302)	–0.91 (2.485)	0.722** (0.311)	11.079*** (1.805)	–0.347 (0.662)	0.263	134.76***	402
All countries	–0.021*** (0.004)	0.497*** (0.083)	–3.738*** (0.853)	0.063* (0.037)	0.018 (0.026)	0.434 (0.298)	0.019	85.29***	7720

Notes: Standard errors in brackets. *, **, *** denote significance at the 10%, 5% and 1% levels, respectively. The Wald test indicates the overall significance of the model.
DR – debt ratio, *Tang* – tangibility, *Size* – company size.

Source: Authors' calculation.

As shown in Table 6, the correlation between capital structure and firm performance remains negative and statistically significant in all countries from the sample, even after entering another explanatory variable in the model. The coefficients for *board size* are statistically significant for Poland and Romania. For the other countries, *board size* is not an influential factor of firm performance. The results regarding the relationship between ROA as a measure of firm performance and control variables are similar with those obtained for the model estimation that did not include board size as an explanatory variable (see Table 3).

The robustness checks for the model (2) with capital structure as dependent variable include the use of short-term debt ratio (*STDR*) as proxy for capital structure, and the introduction of the variable *board size* as explanatory variable.

The results of the model (2) estimation with short-term debt ratio as dependent variable are presented in Table 7.

T a b l e 7

Results of the Estimation for the Capital Structure Model with *STDR* as Dependent Variable

Country	$STDR_{it-1}$	ROA	Size	Tang	Liquidity	Sales Growth	R^2	Wald	Obs.
Bulgaria	0.135*** (0.039)	–0.168*** (0.046)	0.607 (0.868)	–35.26*** (5.161)	–0.726*** (0.112)	0.009 (0.051)	0.08	119.28***	570
Czech Republic	0.223*** (0.042)	–0.181*** (0.036)	3.543*** (1.165)	–27.042*** (5.909)	–0.841*** (0.141)	–0.325 (0.23)	0.04	117.49***	424
Greece	0.29*** (0.02)	–0.366*** (0.056)	–0.634*** (0.204)	–1.284 (2.099)	–3.995*** (0.236)	–3.995 (0.236)	0.136	938.45***	1264
Poland	0.007 (0.025)	–0.291*** (0.027)	0.917 (1.228)	–32.490*** (5.097)	–8.007*** (0.33)	1.279* (0.669)	0.501	743.49***	807
Romania	0.147*** (0.029)	–0.361*** (0.048)	2.801*** (1.029)	–42.37*** (3.873)	–0.408*** (0.064)	–0.27 (0.164)	0.117	242.37***	878
Slovak Republic	0.426*** (0.026)	–0.079*** (0.028)	2.318*** (0.73)	4.944 (3.597)	–1.591*** (0.175)	–0.104 (0.143)	0.075	466.49***	904
Slovenia	0.159*** (0.044)	–0.168** (0.068)	–3.777 (3.553)	–56.239 *** (7.916)	–6.461*** (0.429)	1.801 (2.665)	0.261	276..85***	303
All countries	0.196*** (0.123)	–0.12*** (0.017)	2.002*** (0.495)	–16.568*** (2.748)	–0.604*** (0.063)	–0.081 (0.039)	0.513	465.41***	6002

Notes: Standard errors in brackets. *, **, *** denote significance at the 10%, 5% and 1% levels, respectively. The Wald test indicates the overall significance of the model.
STDR – short-term debt ratio, *Tang* – tangibility, *Size* – company size.

Source: Authors' calculation.

As shown in Table 7, the results of the model estimation having short-term debt ratio as dependent variable are similar with the results obtained when debt ratio is dependent variable.

The inclusion of the new explanatory variable *board size* in the model (2) conducted to the estimation results presented in Table 8.

Table 8

Results of the Estimation for the Debt Ratio (*DR*) Model with *Board Size* as Additional Variable

Country	DR_{it-1}	ROA	Size	Tang	Liquidity	Sales Growth	Board size	R^2	Wald	Obs.
Bulgaria	0.005 (0.04)	–0.268*** (0.04)	–0.064 (0.735)	–12.575*** (4.405)	–0.475*** (0.082)	0.034 (0.043)	–0.549 (0.683)	0.098	90.88***	572
Czech Republic	0.128*** (0.045)	–0.296*** (0.044)	2.126* (1.236)	–25.857*** (6.542)	–0.607*** (0.17)	0.198 (0.229)	–0.645 (1.18)	0.031	78.64***	392
Greece	0.102*** (0.029)	–0.028*** (0.021)	–0.434 (0.502)	–2.656 (3.694)	–1.882*** (0.191)	–0.213 (0.024)	1.053* (0.581)	0.597	110.97***	1083
Poland	0.127*** (0.029)	–0.335*** (0.026)	1.921 (1.204)	–12.084** (4.85)	–5.324*** (0.323)	1.306** (0.65)	–1.468** (0.528)	0.449	460.12***	772
Romania	0.068*** (0.026)	–0.510*** (0.046)	2.818*** (0.991)	–48.350*** (3.663)	–0.496*** (0.056)	–0.234 (0.149)	–0.455 (0.574)	0.184	326.83***	833
Slovak Republic	0.123*** (0.031)	–0.056*** (0.016)	2.121*** (0.745)	–5.548 (3.865)	–0.58*** (0.112)	0.019 (0.055)	0.434 (0.473)	0.024	82.74***	712
Slovenia	0.221*** (0.047)	–0.385*** (0.046)	5.208** (2.345)	–16.82*** (5.2)	–1.113*** (0.283)	7.437*** (1.746)	0.427 (0.445)	0.286	118.81***	303
All countries	–0.016 (0.012)	–0.13*** (0.013)	0.737* (0.391)	–12.7*** (2.136)	–0.438*** (0.047)	0.024 (0.03)	0.511** (0.222)	0.006	210.71***	5802

Notes: Standard errors in brackets. *, **, *** denote significance at the 10%, 5% and 1% levels, respectively. The Wald test indicates the overall significance of the model.
DR – debt ratio, *Tang* – tangibility, *Size* – company size.

Source: Authors' calculation.

As can be noted in Table 8, the results of the estimation of the model having capital structure as dependent variable with *board size* as additional variable are quite similar with those obtained when we estimated the dynamic model without board size (see Table 4).

The correlation between debt ratio and firm performance is still negative and statistically significant in all countries. Board size is statistically significant only for Greece and Poland. We can conclude that *board size* is not an influential factor for capital structure in CEE countries.

Conclusions

This study examines the association between capital structure and firm performance for a sample of non-financial firms from eight CEE transition countries. More specifically, we test the agency costs hypothesis according to which higher debt ratio not only diminishes the agency costs, but also increases firm performance by prompting firms' managers to act more in the interests of shareholders (Jensen and Meckling, 1976).

Our results are not consistent with this hypothesis. In particular, the correlation between debt ratio and ROA as a measure of firm performance was negative and statistically significant for all countries. These results are explained by the fact that indirect costs of financial distress are higher than the benefits of debt, and debt cannot be used as a control mechanism for managers (Berger and Bonaccorsi di Patti, 2006).

Another possible explanation for the negative relationship between capital structure and firm performance is given by the conflicts of interest between debtholders and shareholders, which generate high agency costs that decrease firm performance (Weill, 2003).

The negative correlations between firm performance and debt ratio found for all countries in our sample are contrary to the results obtained for developed countries (Berger and Bonaccorsi di Patti, 2006; Margaritis and Psillaki, 2007) and indicate that all CEE countries in the sample have similar institutional frameworks (Weill, 2003).

Interest rates in emerging countries are higher than in developed ones and the interest payments can be a burden for firms in emerging countries (Le and Phan, 2017).

Therefore, this firms have a lower access to bank credit (Brown et al., 2011), which leads to a lower probability to use debt as a monitoring mechanism for managers, as stated by the agency costs hypothesis (Jensen and Meckling, 1976). In addition, emerging countries have less efficient legal systems that increase the moral hazard problems because creditors' rights are not effectively protected, which finally lead to a negative correlation between capital structure and firm performance (Weill, 2003).

The effect of firm size on performance is positive, which suggests that larger firms have more capacities and resources, and thus they have a higher performance (Frank and Goyal, 2003).

Tangibility has a negative effect on firm performance, supporting treasury management hypothesis (Weill, 2003). Finally, sales growth has a positive effect on firm performance, suggesting that firms with higher growth opportunities have a higher profit.

We also examined reverse causality relationship, from performance to capital structure based on the efficiency-risk hypothesis and the franchise-value hypothesis. The results indicate a negative and statistically significant effect of performance on capital structure in all countries from the sample, supporting the franchise-value hypothesis. These results suggest that firms from CEE countries try to protect their expected income by using more equity and less debt as financing sources and, therefore, investors should interpret the lower debt ratio of firms as a sign of firm's strength rather than a weakness (Margaritis and Psillaki, 2010).

Furthermore, the influence of firm size on capital structure is positive indicating that larger firms have easier access to debt because they are considered more stable (Myers, 2003). The result indicating a negative effect of tangibility on capital structure for the firms from CEE countries is consistent with the findings for developed countries, according to which tangible assets are used in a lesser extent as collateral for debt (Nivorozhkin, 2005).

Finally, the relationship between liquidity and debt ratio is negative and statistically significant for all countries from our sample. This result suggests that firms from CEE countries, which have higher liquidity use more internal sources than debt to finance their activities (Mazur, 2007).

The models used in this study to explain the relationship between capital structure and firm performance are robust to a number of tests, which include the use of another proxy for firm performance and the inclusion of the first order lag for this dependent variable.

Overall, the current study shows that firms from CEE countries have a similar financing behavior and that this behavior has comparable effects on firm performance. Future research should use more sophisticated proxies for firm performance (e.g., profit efficiency) and should focus on different aspects of ownership structure when examining the capital structure-firm performance relationship.

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