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Capital Structure Determinants of Forest Enterprises: Empirical Study Based on Panel Data Analysis from the Czech Republic, Slovakia, and Bulgaria

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Abstract: At present, forest enterprises face many challenges in adopting innovative bio-based approaches considering global changes. Due to the specifics of forestry, the choice of financing sources is a complex issue. The aim of this study is to estimate the capital structure determinants of forest enterprises in the Czech Republic, Slovakia, and Bulgaria in the context of the relationship between leverage and the factors of its appearance. The evaluation of capital structure determinants was carried out using selected indicators for 18 forest enterprises, with 6 enterprises per country. Data were processed for the period of 2015–2019. The study methodology was based on a Panel Data Analysis with Fixed Effects and Random Effect models and Ordinary Least Squares estimation. The following specific variables were included: liquidity, leverage, return on assets, size of the enterprises, and gross domestic product. The results revealed that the forest enterprises in these three countries can be differentiated by size and form individual functional relationships with the positive influence of enterprise size on liability share. The next significant determinant was found to be liquidity, which has a negative relationship with enterprise leverage. These results will be useful for managers of forest enterprises in decision-making processes to determine the amount of debt and planning investment programme strategies.

Keywords: forest enterprises; capital structure; panel data analysis; leverage; forestry

Citation: Neykov, N.; Krišťáková, S.; Antov, P.; Halalisan, A.-F.; Hajdúchová, I.; Sedliačiková, M.; Sloup, R.; Šišák, L. Capital Structure Determinants of Forest Enterprises: Empirical Study Based on Panel Data Analysis from the Czech Republic, Slovakia, and Bulgaria. *Forests* **2022**, *13*, 749. https://doi.org/10.3390/f13050749

Academic Editor: John Innes

Received: 30 March 2022
Accepted: 10 May 2022
Published: 12 May 2022

1. Introduction

In the context of bioeconomic developments, an important challenge for the forestry sector is moving towards a horizontally and vertically integrated sector, covering the entire value chain of forest products and services, and adopting sustainable development as its core principle. The capital structure of the forest-based sector is an important, yet rarely investigated, issue. Moreover, the forest sector is quite specific, and trivial decisions in different processing industries should be examined, e.g., extremely long production cycles, relatively short working hours, the seasonal nature of timber harvesting, the multifunctionality of forest production, and the limitations of natural capital, as well as law enforcement [1–4]. Even though forest enterprises face unpredictable situations that occur on a daily basis, such enterprises try to meet their goals in accordance with green economy principles [5].

Modigliani and Miller [6] determined that enterprises make financial decisions irrelevant to their value. According to Abeywardhana [7], capital structure theory is an outcome of the various decisions that firms take over time. Özçelik et al. [8] noted that, in the real world, without the constraints of theoretical assumptions, managerial decisions regarding capital structure may provide signals about future conditions. The existence of forests as assets and the equipment for their steering defines the need to involve significant financial resources to achieve an efficient scale. In this context, leverage can be considered an indicator for success if enterprises use debt for financing. Furthermore, the speed of adjustment to a leverage target has become a crucial issue for companies [9].

Enterprises in the Czech Republic, Slovakia, and Bulgaria operate in different environments and can be differentiated by the local natural resources and national legislation. According to Badini et al. [10] and Neykov et al. [11], issues regarding the assessment of efficiency, capital structure, etc. in forestry appear through elements of the macro-environment in terms of social, political, economic, and technological contexts. The current study aims to reveal the determinants of the capital structures of forest enterprises in these three countries in the context of the relationship between leverage and the factors of its appearance.

Literature Review on Capital Structure Determinants

Many authors have studied capital structure and sought to reveal its main driving forces. Mendel et al. [12] tested three hypotheses on the factors that influence the debt levels in wood-processing companies. The authors examined whether pre-tax profits increase the debt levels and the size of an enterprise or whether tax shields lower debt. According to the results in this study, the size of a wood-processing enterprise in terms of sales has a negative influence, as estimated through Panel Data and Ordinary Least Squares (OLS) regression with fixed effects. Mokhova and Zinecker [13] revealed the relationships between macroeconomic factors and the capital structure of enterprises in different countries, including Slovakia and the Czech Republic. The authors discovered the negative relationship between the gross domestic product (GDP) and debt of different companies in these two countries. Similar determinants were investigated by Metelskaya [14], who noted that corporate capital structure formation is strongly influenced by macroeconomic factors. The same author revealed the strong influence of factors such as return on assets. Susanti et al. [15] examined a model for assessing the effects of leverage, liquidity, and profitability on financial distress and obtained significant results for these factors.

Many studies have investigated the quantitative measurements and relationships between leverage and the internal or external factors of enterprises. Ali [16] estimated the regression equation between Return On Assets (*ROA*) and the degrees of Financial Leverage, measured through different ratios. Zafar et al. [17], Song [18], Jovanovic [19], Samarakoon et al. [20], and Singh [21] calculated the panel data for leverage, such as a dependent variable, explained with internal enterprise financial parameters. Růčková and Škuláňová [22] analysed the capital structure determinants for the agriculture, forestry, and fishing industries in Central and Eastern Europe. The authors studied these three sectors together based on data for the period of 2009–2016. This research is very valuable, especially for analysing the capital structure of forestry in different European countries using a deterministic approach based on ratios. Ankudo-Jankowska [23], Viszlai [24], and Krišťáková et al. [25] assessed the capital structures of Polish and Slovak forest enterprises via financial ratios.

Song [18] defined the following explanatory variables: tangibility (asset structure), non-debt tax shield, profitability, size, expected growth, uniqueness, income variability, and time dummies. The author outlined the determinants of capital and variables that define the leverage of the enterprise. Jovanovich [19] investigated the following explanatory variables of leverage through panel data equations: size, tangibility, profitability, growth potential, taxes, and macroeconomic environment. The authors included specific features for each studied enterprise. Furthermore, the relationship between capital structure and asset structure explains the nature of capital utilisation and the quality of decisions in this

area. A common characteristic is that the dependent variable is the financial leverage of the enterprise. Singh [21] included the same variables, but without the macroeconomic indicators. Firm size is commonly involved in studies on the variables affecting company leverage. Kurshev and Strebulaev [26] found that the relationship between size and leverage is negative during periods of debt recovery and refinancing. Alkhatib [27] demonstrated that there is a negative relationship between profitability and leverage, but the consistency of the model is controversial. Vintila and Duca [28] estimated a strong negative relationship between size and Return on Equity and a strong positive relationship between profitability and size.

In the current study, the methodology implemented is similar to that used by Song [18], Jovanovic [19], and Singh [21]. These authors used determinants of the capital structure or the leverage of different companies as explanatory variables in the panel data model along with external economic variables. Some macroeconomic elements were also previously included, such as those in the works by De Leon and Kanwal [29], Nadeem [30], and Růčková and Škuláňová [22]. According to the lack of up-to-date panel data research on the capital structure of forestry in Central and Eastern European countries, the current study is aimed at improving knowledge on leverage determinants. The present study is based on information from various enterprises, revealing the situation at an enterprise level. The aim of the present study is to estimate the capital structure determinants of forest enterprises in the Czech Republic, Slovakia, and Bulgaria in the context of the relationship between leverage and factors of its appearance by using panel data analysis for the period of 2015–2019.

2. Materials and Methods

2.1. Enterprises—Data and Preliminary Analysis

In the current study, the selected indicators of 18 forest enterprises from the Czech Republic, Slovakia, and Bulgaria were investigated, with 6 enterprises per participating country. All the enterprises provide production services connected to forest management and timber harvesting. Within the sample, companies differ from each other in the form of ownership, organisational structure, size of the company, as well as the size of the managed area. The levels of reporting and accounting among the companies, as well as their access to information, are also different. Taking into account all the above-mentioned information, the enterprises were classified into several groups according to their size and the scale of their economic activities.

This study has several limitations that should be carefully assessed. First, the study did not consider other factors that may affect leverage and firms' performance, such as corporate governance and forest policy. Another limitation that should be emphasized is the sample of analysed forestry companies, which means that these findings cannot be generalized to other sectors.

The enterprises included in the current research reveal the situation with capital structure determinants, regardless of what the enterprise is or who owns it. The sole constraint in this paper is that only large-scale enterprises were analysed. The six Slovak enterprises (SL SR, s.e., VojenL, s.e., ML Kremnica, Ltd., ML KEJSC., S. Lupca, Ltd. and S. Stiavnik, Ltd.) varied significantly in the asset amounts, liabilities and profits, and size according to ownership structure. The situation with the Czech enterprises (Borova, s.e., LCR, s.e., MLBrnoJSC., MLHK, JSC., Pribyslav, CE., and VLCR, s.e.) was found to be similar. In total, six very large Bulgarian enterprises were included in this research. In contrast to the Slovak and Czech enterprises, the Bulgarian enterprises (NWSE Ltd.—Vratsa, Bulgaria, NCSE Ltd.—Gabrovo, Bulgaria, NESE Ltd.—Shumen, Bulgaria, SWSE Ltd.—Blagoevgrad, SCSE Ltd.—Smolian, Bulgaria and SESE Ltd.—Sliven, Bulgaria) are state-owned. They function as private entities but can rely on help if their debt becomes unmanageable. The main characteristics of each enterprise are presented in Table 1.

Table 1. General features of the analysed enterprises.

Enterprise Name	Assets, EUR 1000	Liabilities, EUR 1000	Profits, EUR 1000	Area of Steering, 1000 ha	Area of State Forests, 1000 ha
NWSE	13,737.90	8768.29	208.59	512.02	512.02
NCSE	38,627.72	30,599.39	708.24	246.62	246.62
NESE	31,322.15	24,140.15	258.62	271.22	271.22
SWSE	137,985.17	131,141.38	550.79	680.66	680.66
SCSE	70,095.75	26,746.70	1703.84	717.19	717.19
SESE	29,214.53	22,539.34	709.87	644.10	644.10
ML KE	5474.32	772.11	272.41	19.43	-
ML Kremnica	2975.19	300.81	188.56	9.70	-
S. Lupca	5108.93	918.37	269.69	5.05	-
S. Stiavnik	2934.82	1062.11	0.27	2.37	-
SL SR	891,780.20	66,372.43	6432.24	-	880.69
VojenL	92,750.84	10,760.53	186.59	-	62.93
Borova	1203.28	261.60	50.69	1.08	-
LCR	2,521,215.50	71,320.38	93,432.69	-	1193.76
MLBrno	10,533.48	822.21	421.44	8.26	-
MLHK	3936.82	822.21	421.44	3.71	-
Pribyslav	4612.37	583.72	193.25	5.94	-
VLCR	356,824.07	26,750.50	8019.89	-	129.96

The data in Table 1 indicate that some of the enterprises are state-owned and some are private. This makes the analysis more representative for enterprises and more specific for their internal elements, such as processes and resources, regardless of the type of ownership. Conversely, Bulgarian enterprises are only state-owned, which make the results valuable for Bulgarian forestry as a whole. The results in Table 1 show that some of the parameters of the investigated enterprises varied significantly. SWSE in Bulgaria had four times more assets than SESE and ten times more than NWSE. This situation was almost the same in the other analysed countries. There were also significant differences in profits, e.g., the Slovak enterprise S. Stiavnik had 23 times lower profit than the enterprise SLSR. In Slovakia and the Czech Republic, the state-owned areas of steering encompassed 96% and 98% of total forest area, respectively. According to these results, the conclusions of the current study are significantly applicable to state-owned forests. Descriptive statistics for the enterprises in the analysed countries are presented in Table 2. These statistics are necessary to determine the stability and scale of each enterprise country-by-country.

Table 2. Descriptive statistics for each country.

Indicator	Elements	Czech Republic	Slovakia	Bulgaria
Average	Assets	EUR 920,502,736.76	EUR 166,837,384.67	EUR 53,497,203.75
	Liabilities	EUR 37,790,885.59	EUR 26,728,785.63	EUR 40,655,873.83
Coefficient of variation	Assets	1.91	1.95	0.77
	Liabilities	1.44	1.79	1.01
Range	Assets	EUR 2,520,012,226.20	EUR 888,845,376.00	EUR 124,247,263.43
	Liabilities	EUR 98,740,625.40	EUR 132,143,248.00	EUR 122,373,094.63

The outcomes of the descriptive statistics revealed that the Czech Republic forest enterprises had the highest average value of assets per enterprise. While the variations were close to those of the Slovak enterprises, the difference between the max and min values (the range) of the assets was much greater. In fact, the Czech enterprises had the highest value of assets, but not the highest variation among the countries. Slovak forest enterprises were the most inhomogeneous in their enterprise assets and liabilities. On the other hand, Bulgaria had the smallest range among the analysed enterprises within the three examined

countries. Bulgarian forest enterprises were also the most homogenous ones, having the smallest variation of assets. This result might be due to the management-determined scale of all enterprises. The panel data analysis described below reveals the common features of the enterprises and their differences in capital structure. This approach is, therefore, very useful for differentiating the genesis of enterprises. While the Czech and Slovak companies evolved in a somewhat natural and market-derived way, the Bulgarian forest enterprises were preliminarily determined without any market transactions in order to create venture capital.

The enterprises were grouped into four quadrants according to the levels of leverage and *ROA*. This preliminary analysis facilitated the subsequent analysis after acquiring panel data. A graphical representation of the groupings under these two indicators is presented in Figure 1.

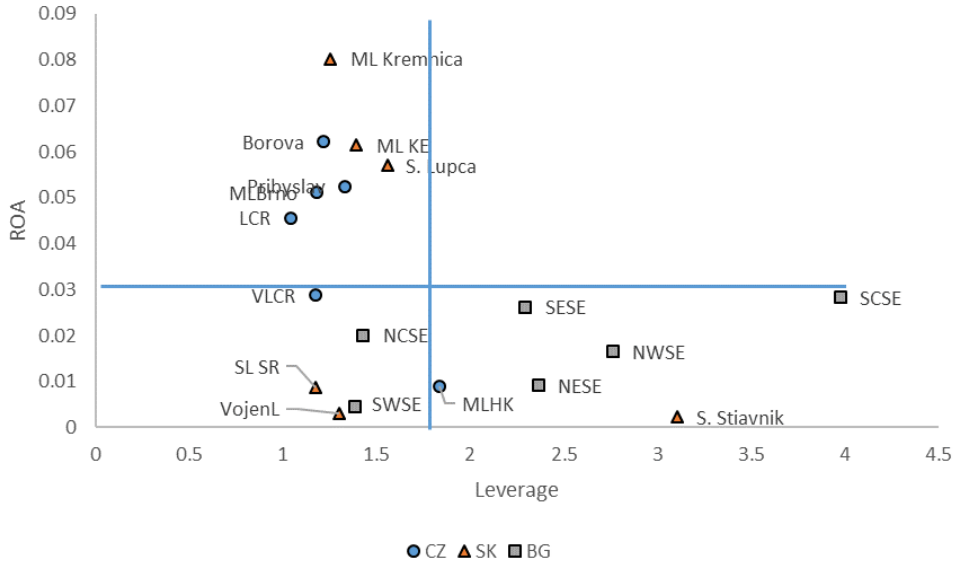

Figure 1. Grouping the enterprises according to the average leverage and *ROA* (Origin of authors).

The vertical line in Figure 1 represents the average financial leverage, and the horizontal one represents the average *ROA* values. The figure divides the enterprises into four groups. The first one called Q-1 includes seven enterprises with low leverage and a high *ROA*; 57% of these enterprises are Czech and 42% Slovak, respectively. The second group, Q-2, includes enterprises with a low *ROA* and low leverage. Most of the Bulgarian enterprises are categorized under Q-3, with high leverage and a small *ROA*.

Figure 2 reveals an interesting division among the studied enterprises. Due to their close genesis, the Slovak and Czech companies are distributed similarly. In contrast, the Bulgarian enterprises are spread in almost all the quadrants. Four enterprises, i.e., two Bulgarian, one Slovak, and one Czech company, are categorized in Q-1, with below-average leverage and above-average indebtedness. Most of the Czech and Slovak enterprises are characterised by low leverage and low indebtedness (Q-2). The Bulgarian enterprises have high leverage and low indebtedness (Q-4). There is only one enterprise in Q-3 with high leverage and indebtedness below average. This is a typical situation for financial leverage and can be considered "the main group". The exceptions present something specific to the particular enterprise. Panel data analysis (PDA) revealed the specific features that determine whether the enterprise is out of the "main group".

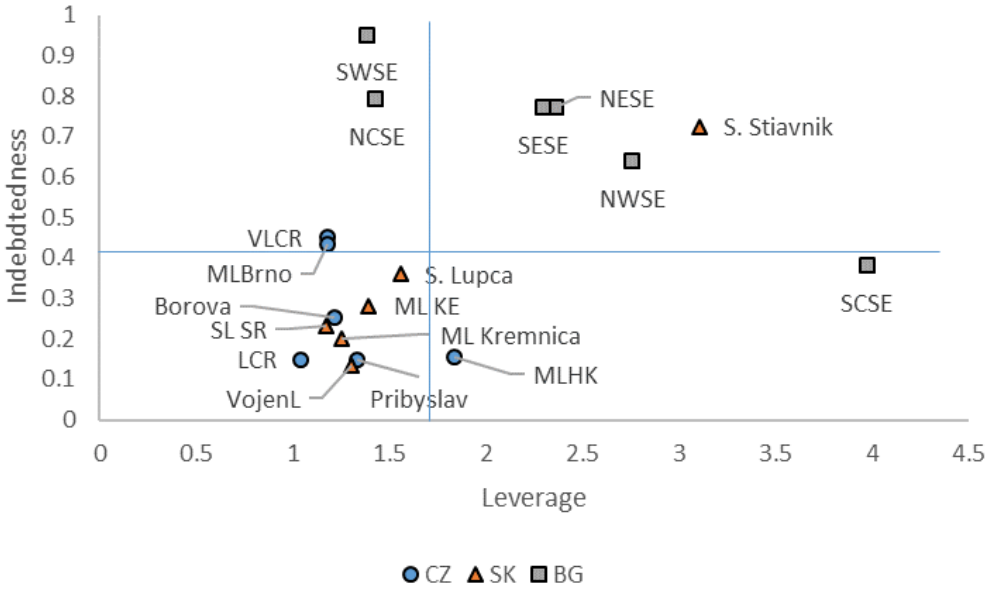

Figure 2. Grouping the enterprises according to average leverage and indebtedness (from the present authors).

2.2. Panel Data Analysis (PDA)

The panel data approach involves a dataset in which the behaviours of entities can be observed and analysed over time. This method allows one to control, at different levels of analysis, the variables adopted by different companies that cannot be measured or monitored, such as differences in business practices [31]. In the present study, fixed effect (FE) models were used along with random effects (RE) models. FE models explore the relationship between the predictor and outcome variables within a company. Each company has its own individual characteristics influenced by a corporate culture that may or may not influence the predictor variables [32]. The rationale behind the RE model is that, unlike the FE model, the variation across companies is assumed to be random and uncorrelated with the predictor or independent variables included in the model [33].

Some research variables are given in double natural logarithmic forms similar to those in Kirui et al. [34]. To clarify the differences between forest enterprises in the three investigated countries and not include many variables with similar characteristics, we included the following variables in the model:

- Return on assets: This variable reveals the influence of the management of equipment and machinery on leverage.
- Current ratio: This variable corresponds to the ability of enterprises to keep their current assets at efficient levels based on availability.
- Size: This is the sum of total assets and total liabilities or debt. This variable defines the scale of the enterprises and determines their propensity to use debt according to scale.
- Liquidity: This is a very important indicator that reveals the ability of an enterprise's management to remain liquid and steer current assets in the best way possible.
- Gross Domestic Product (GDP)—real value for the current period: The levels of the GDP differ between enterprises based on each country's specifics. The positive relationships between leverage and GDP obtained by some authors should be examined in the case of forestry.

According to Vijayamohanan [35], FE models can be presented using the following specifics:

Intercept varies over companies, countries, and time, but the essence of the leverage functional relationships does not change among companies, countries, or time. This group

of models shows that the fundamental processes that generate leverage are the same for all companies:

$$\ln Y_{it} = \beta_0 + \beta_1 \ln ROA_{it} + \beta_2 \ln LIQ_{it} + \beta_3 \ln SIZE_{it} + \beta_4 \mathrm{GDP}_{ct} + \beta_t D_t + \beta_e D_e + \beta_c D_c + \mu_{it} \quad (1)$$

where Y_{it} is the financial leverage of each forest enterprise i in year t. β_0 is the constant term, which is common for the whole set of enterprises. ROA_{it} is Return on Assets of enterprise i in year t. LIQ_{it} is the Current Ratio of enterprise i in year t. $SIZE$ is the variable for the size of the enterprise and includes a natural logarithm of total assets (see [19]). GDP_{ct} is the natural logarithm of the real gross domestic product of country c in year t. $SIZE$ is a natural logarithm of the sum of the long-term and short-term assets of each company, which represents the size of each enterprise. D_e is the dummy variable for the enterprises. Dummy variables $\beta_e D_e$ total 18, following the number of enterprises in this study. Dummy time variables $\beta_t D_t$ [18,35,36] total 5 based on the numbers of years covered in this study. Dummy variables for countries $\beta_c D_c$ total 3. μ_{it} is the stochastic error term.

All coefficients (intercept and slope) vary between companies, countries, and time specifics.

The estimation of all the above-mentioned models is necessary to determine the influence of enterprise, country, or time specifics on marginal effects, described by the regression coefficient β. Everything changes in this type of equation, and the enterprises each have different leverage functions. Moreover, the marginal effects of the variables on leverage differ (i.e., the regression coefficients are different). Here, the cases should be preliminarily pre-screened to avoid multicollinearity and misspecification. The equation functions differently for dummy variables. Every equation is used according to assumptions regarding the influence of particular variables on the companies. The function is as follows:

$$\ln Y_{it} = \gamma_0 + \gamma_1 \ln ROA_{it} + \gamma_2 \ln LIQ_{it} + \gamma_3 \ln SIZE_{it} + \gamma_4 \mathrm{GDP}_{it} + \gamma_5 (D_e \ln ROA_{it}) + \gamma_6 (D_e \ln LIQ_{it}) + \gamma_7 (D_e \ln ROA_{it}) + \gamma_8 (D_c \ln \mathrm{GDP}_{it}) + \varepsilon_{it} \quad (2)$$

where the coefficients from γ_1 to γ_4 determine the slopes of the curves common among all enterprises. Coefficients from γ_5 to γ_8 are individual corrections (slope corrections due to fixed effects) for each enterprise.

The individual slope coefficients for each enterprise are determined by the following equations:

$$\text{Slope of } ROA_t = \gamma_1 + \gamma_5 \quad (3)$$

$$\text{Slope of } LIQ_{it} : \ \gamma_2 + \gamma_6 \quad (4)$$

$$\text{Slope of } SIZE_{it} : \ \gamma_3 + \gamma_7 \quad (5)$$

The slopes of GDP are determined by differences in country, not enterprise. For the comparatively short period investigated here and the small number of countries in the current research, it is not appropriate to distinguish the GDP influence on each enterprise. For this reason, the country dummy was considered most appropriate for the slopes of this variable.

All variables were tested using a pooled t-test [37]. In this way, it was possible to estimate the significance of the pooled variables, such as dummy variables [35]. The analysis was also complemented with the random effects model based on its great advantages as described in the literature [38,39]. The choice between FE and RE was made using the Hausman test for random effects. The analysis was supplemented by decomposition to the country level. In this way, it was possible to estimate Equations (1) and (2) for each country excluding the GDP variable.

The test for the applicability of FE or RE was performed using the RE equation with all factors included:

$$\ln Y_{it} = \beta_0 + \beta_1 \ln ROA_{it} + \beta_2 \ln LIQ_{it} + \beta_3 \ln SIZE_{it} + \beta_4 \mathrm{GDP}_{it} + u_{it} + \varepsilon_{it} \quad (6)$$

where u_{it} is the between-group error and ε_{it} is the within-group error. RE assumes that the error term is not correlated with the variables. This measure allows the factor influence to be estimated in an enterprise-, time-, or country-invariant manner.

In the current research, all calculations and modelling testing were performed using Stata ver. 16 (StataCorp LLC, College Station, TX, USA).

3. Results and Discussion

The first step was to examine the multicollinearity threats by correlating the variables in the model. This is common PDA practice. Table 3 presents the correlation matrix.

Table 3. Pearson correlation matrix.

	Leverage	***ROA***	**Liquidity**	**GDP**	**Size**
Leverage	1				
ROA	−0.18423	1			
Liquidity	0.020255	0.351471	1		
GDP	−0.4451	0.182978	−0.04112	1	
Size	−0.18813	−0.22016	−0.15829	−0.0756	1

This table reveals that there were no significantly correlated variables, all of which exceeded the threshold of 0.8. Hence, there was no threat of multicollinearity.

The presence of autocorrelation was tested for all variables through Born and Breitung [40] tests. The only variable with the presence of first-order autocorrelation was GDP. In this way, the estimation of the coefficients was consistent, but the standard errors were not. This variable was included in the first estimation model to examine if the GDP had a significant influence on the leverage.

The next step was to examine the applicability of Equations (1) and (2). Table 4 presents the results for the FE and RE equations.

Table 4. Results for FE and RE using $\alpha = 0.05$ with panels.

Variables	**Fixed Effects Model (FE)**		**Random Effects Model (RE)**	
	Coefficient	***p*-Value**	**Coefficient**	***p*-Value**
ln*ROA*	−0.013	0.064	−0.002	0.710
ln*LIQ*	−0.113	0.131	−0.137	0.029
lnGDP	−0.677	0.040	−0.207	0.255
ln*SIZE*	0.927	0.000	0.013	0.762
cons	1.806	0.771	5.576	0.248
p-value	0		0.29	

Table 3 clearly reveals the significance of each of the models. The RE model (4) was not significant (p-value = 0.29). For this reason, we adopted FE as the appropriate model. The results were derived by using the Windmeijer correction to produce robust error terms to avoid heteroscedasticity. In this case, the Hausman test was complementary and presented a p-value of 0.000. Under H0, the difference in coefficients was not systematic, which confirmed the applicability of the FE models. This analysis could be elaborated by performing a comprehensive analysis of Equations (1) and (2). The results of Equation (1) are presented in Table 5.

Table 5. Panel data results for model (1): $\alpha = 0.05$; R = 932.

Variables	Coefficient	*p*-Value
Slopes		
ln*ROA*	−0.015	0.093
ln*LIQ*	−0.104	0.002
lnGDP	−0.805	0.232
ln*SIZE*	0.954	0.000
Enterprise Dummies		
LCR	−7.793	0.000
ML KE	−2.254	0.002
ML Kremnica	−1.702	0.008
MLBrno	−2.404	0.000
MLHK	−1.049	0.000
NCSE	−4.471	0.000
NESE	−3.886	0.002
NWSE	−2.988	0.008
Pribyslav	−1.509	0.000
S. Lupca	−2.067	0.004
S. Stiavnik	−1.141	0.075
SCSE	−3.972	0.003
SESE	−3.923	0.001
SL SR	−7.359	0.000
SWSE	−5.964	0.000
VLCR	−5.838	0.000
VojenL	−5.234	0.000
Time Dummies		
2016	0.006	0.894
2017	0.041	0.613
2018	0.064	0.594
2019	0.011	0.947
Country Dummies		
Slovakia	-	-
Bulgaria	-	-
Constant—β	8.093	0.641

The results in Table 4 indicate that enterprise specifics were the most significant FE source. GDP was not a significant variable. Thus, in compliance with autocorrelation, GDP was removed from subsequent analyses. In addition, some of the dummies (Bulgaria and Slovakia) were omitted due to multicollinearity. The slopes of the curves were significant for liquidity (ln*LIQ*) and the size (ln*SIZE*) of the enterprises. In this context, the dominant factor for leverage in this model was the size (ln*SIZE*) of each enterprise, $\beta_3 = 0.954$. According to the essence of the model, the company size increased the leverage effect with a constant elasticity of 0.954. This result is consistent with the findings of Singh [21], Rajan and Zingales [41], Flannery and Rangan [42], Antoniou et al. [43], Jovanovic [19], Bourke [44], and Chatterjee and Eyigungor, B. [45]. The liquidity of the enterprises was a less statistically significant factor ($p = 0.024$) for leverage and was weaker than ln*SIZE*. Moreover, a negative relationship was observed between leverage and the liquidity with a constant elasticity of $\beta_2 = -0.104$. The results for liquidity were consistent with those of Šarlija and Harc [46] and Susanti et al. [15]. Time did not influence the enterprises' capital structures or leverage levels. However, the countries were characterised by multicollinearity, and it was not clear whether the country specifics influenced the differences in leverage observed between enterprises under this model. The enterprise individual parameters had a particular focus on the strongest factors for the appearance of FE, rather than random ones. The model suggests an individual intercept for each enterprise. To clarify the individual FE values, we

calculated the model again, while omitting insignificant variables. The results are presented in Table 6.

Table 6. Panel data results with omitted insignificant variables for model (1): $\alpha = 0.05$.

Variables	Coefficient	*p*-Value
Slopes		
ln*LIQ*	−0.104	0.003
ln*SIZE*	0.647	0.000
Enterprise Dummies		
LCR	−5.395	0.000
ML KE	−1.115	0.000
ML Kremnica	−0.755	0.000
MLBrno	−1.723	0.000
MLHK	−0.643	0.001
NCSE	−2.325	0.000
NESE	−1.792	0.000
NWSE	−1.155	0.001
Pribyslav	−1.082	0.000
S. Lupca	−0.905	0.000
S. Stiavnik	−0.147	0.304
SCSE	−1.648	0.003
SESE	−1.861	0.000
SL SR	−4.629	0.000
SWSE	−3.399	0.000
VLCR	−4.060	0.000
VojenL	−3.181	0.000
Constant—β	−8.495	0.000

Here, the results revealed that the significance of the factors increased after omitting the insignificant variables from previous models. Additionally, the marginal effects of liquidity and size were corrected. It should also be underlined that the elasticity of leverage according to the enterprise size was found to be 0.64, while that according to liquidity was 0.104. Thus, if the model above is appropriate, the forest enterprises in all three countries increased the leverage effect by 64%. Increasing leverage size by 1% and maintaining high liquidity resulted in a decrease in financial leverage by 10.4%. All these results are valid if the FEs are presented in errors and hence in the constant term of Equation (1). If differences appeared in the relationship between the independent variables and financial leverage, then this influence would appear in the slopes of the curves. The results under this assumption using Equation (2) are outlined in Table 6. Indeed, these results were produced by experimenting with different variants of Equation (2).

The results in Table 7 indicate that the statistical significance of the coefficients significantly decreased. Considering these results, the only significant factor was found to be the size of the enterprise. The corrections of the slope coefficients were not significant. The pooled tests for significance that we applied in post estimation showed that, in general, the variables were significant. However, it is obvious from the table that all the enterprises could be classified as exceptions [35], which means that this model is not appropriate. The squared R is high (0.998) due to the higher quantity of variables included in the model. For these reasons, we sought another possible model with the highest individual significance among coefficients to avoid the assumptions related to exceptions in some of the enterprises. This model is presented in Table 8.

Table 7. Panel data results for model (2) with enterprise-difference-based slope corrections: α = 0.05; R = 0.998.

	Slopes Corrections					
	ln*LIQ*	*p*-Value	ln*ROA*	*p*-Value	*SIZE*	*p*-Value
LCR	0.243	0.524	−0.063	0.53	−0.939	0.385
ML KE	−0.083	0.816	−0.111	0.362	−0.296	0.775
ML Kremnica	0.113	0.803	−0.058	0.668	−0.43	0.474
MLBrno	0.153	0.747	−0.082	0.468	0.2	0.861
MLHK	0.193	0.508	−0.161	0.388	0.616	0.587
NCSE	0.032	0.911	0.044	0.826	−1.288	0.222
NESE	0.135	0.637	−0.082	0.471	−2.107	0.502
NWSE	0.104	0.72	−0.095	0.437	−0.192	0.818
Pribyslav	0.054	0.89	−0.07	0.494	−0.342	0.514
S. Lupca	0.248	0.497	−0.062	0.533	−0.405	0.365
S. Stiavnik	−0.47	0.122	−0.195	0.176	0.563	0.002
SCSE	0.045	0.893	−0.142	0.322	−0.564	0.494
SESE	−0.054	0.85	−0.171	0.103	5.699	0
SL SR	−0.009	0.982	−0.054	0.757	−0.083	0.907
SWSE	0.159	0.585	−0.045	0.78	−2.079	0.675
VLCR	0.041	0.93	−0.073	0.652	−0.103	0.972
VojenL	0.15	0.608	−0.067	0.532	−0.723	0.396
			Slopes			
		Coefficients			*p*-value	
liquidityln		−0.143			0.616	
roaln		0.063			0.524	
size		0.804			0.000	

Table 8. Panel data results for model (2) with significant slope (elasticity) corrections: α = 0.05; R = 0.915.

Variables	Coefficient	*p*-Value
Slopes		
ln*LIQ*	−0.105	0.036
ln*SIZE*	0.696	0.000
	Enterprise Corrections of ln*SIZE* slope	
LCR	−0.266	0.000
ML KE	−0.077	0.000
ML Kremnica	−0.054	0.000
MLBrno	−0.113	0.000
MLHK	−0.046	0.000
NCSE	−0.143	0.000
NESE	−0.113	0.000
NWSE	−0.078	0.000
Pribyslav	−0.075	0.000
S. Lupca	−0.063	0.000
S. Stiavnik	−0.013	0.506
SCSE	−0.102	0.000
SESE	−0.117	0.000
SL SR	−0.240	0.000
SWSE	−0.194	0.000
VLCR	−0.220	0.000
VojenL	−0.185	0.000
Constant—β	−9.17033	0.000

In relation to model (2) with the dummies, Table 8 clarifies the results. These results suggest the improvement of the models and provide approximately correct assumptions about the nature of the genesis of leverage. These results are consistent with previous

research, such as Chipeta and Mbululu [47], Bastos et al. [48], Camara [49], and Dincergok and Yalciner [50]. In addition, liquidity was retained with a negative sign on the border of significance. However, all corrections of size were negative, which reveals the individual elasticities of leverage with respect to the size of each forest enterprise.

The negative elasticity of leverage with respect to liquidity means that the debt of the forest enterprises is necessary for the procurement of current assets. Moreover, the bigger the size of the enterprise, the better capabilities the enterprise has to finance its economic activities. It should be stressed that size is a typical reason for forest enterprises to be very confident with their credit use.

In the current research, the classification of forest enterprises was elaborated by the grouping presented in Figures 1 and 2, as well as the individual slopes of leverage with respect to size. The Czech enterprises were characterised by the second highest average slope coefficient (elasticity) for size (0.603; estimated by Equation (5)) and the highest standard deviation (0.0.93). In this context, the forest enterprises managed to achieve a high *ROA* with low indebtedness for the period of research. Furthermore, these enterprises were confident in their understanding that a larger size is more suitable for external financing. For all enterprises included in this research, the elasticity of leverage by liquidity (*LIQ*) was negative and equal to −0.105. The results for the size elasticities of the investigated samples of enterprises are presented in Table 9.

Table 9. Size elasticities (slopes) of leverage for the Czech forest enterprises.

Enterprise	Elasticity
Borova	0.696
LCR	0.429
MLBrno	0.619
MLHK	0.642
Pribyslav	0.583
VLCR	0.650

The equations in Table 9 and the resulting tables for other enterprises show the elasticity of the financial leverage for each enterprise. Based on these findings, the enterprise with the steepest slope in *SIZE* was Borova with a coefficient of 0.696. Most of the Czech enterprises were characterized by a high *ROA*, with only two exceptions: MLHK and VLCR. MLHK had a steeper *SIZE* slope and high leverage, while VLCR had a similar slope coefficient and low leverage. The leverage level is not directly connected to the propensity to borrow. On the other hand, three enterprises, Borova, MHLK, and VLCR, were exceptions among the main group of Czech enterprises and presented low leverage, low indebtedness, and high return on assets (*ROA*).

According to the results, the Slovak enterprises were not very different from the Czech ones, but had a lower deviation value of 0.059. Moreover, the slopes of Slovak enterprises were the highest among the set of enterprises (0.612), but the difference was quite small. Their main group consisted of enterprises with low *ROA*s. These enterprises were characterised by low leverage and small indebtedness, without any exceptions. One of the enterprises, S. Stiavnik, had a comparatively steep *SIZE* slope and high leverage. Indeed, three of the Slovak enterprises had higher *SIZE* slope coefficients than the Czech ones, but the value of $\gamma_3 + \gamma_7$ for the Borova (a Czech enterprise) slope was the steepest. Hence, Slovak enterprises were more willing to borrow in the case of a bigger size. The elasticities for the Slovak enterprises are presented in Table 10.

Table 10. *SIZE* elasticities (slopes) of leverage for the Slovak forest enterprises.

Enterprise	Elasticity
ML KE	0.619
ML Kremnica	0.642
S. Lupca	0.633
S. Stiavnik	0.683
SL SR	0.511
VojenL	0.583

The Bulgarian forest enterprises were the most homogenous according to the *SIZE* slope, with an average slope of 0.571. The standard deviation was 0.040, which reveals the functional similarities among all Bulgarian enterprises. The major group was characterised by a high indebtedness, low *ROA*, and high leverage. On the contrary, the size was not an important factor in accruing loans. The North Central State Enterprise and the North-East State Enterprise had high indebtedness and leverage below the mean values. There is a possible negative relationship between leverage and indebtedness. This relationship could be attributed to the fact that the Bulgarian enterprises are state-owned. For every euro received as a debt, the State subsidises the enterprises, which then improve their equity alongside the amount of their loans. Table 11 presents the elasticities for the Bulgarian enterprises.

Table 11. *SIZE* elasticities (slopes) of leverage for the Bulgarian forest enterprises.

Enterprise	Elasticity
NWSE	0.618
NCSE	0.553
NESE	0.583
SWSE	0.502
SCSE	0.594
SESE	0.578

Here, the slopes are more evenly distributed. When the Slovak and Czech enterprises approach a lower size and begin to be financed by loans, the Bulgarian enterprises comfortably wait for governmental help. In addition, the relationship between elasticity and size was negative and almost linear, unlike enterprises in the other two countries, where the relationship was power-like.

These results provide interesting information on the elasticities of leverage in each country. Despite the observed differences, values ranged from 42.9% to 69.6%. Moreover, differences in the average values for each country were very slight. It can be hypothesised that the elasticity of leverage with respect to enterprise size is about 60% among the investigated countries.

The results of this paper are in line with those of previous research. According to the research conducted by Koksal and Orman [51], industry types that reflect a number of specifics may be an important determinant of firms' capital structures. In addition, the findings of Viszlai [24], who analysed state-owned forest enterprises in Slovakia, indicated that forest enterprises use external sources for financing in very low proportions. Moreover, small- and medium-sized forestry enterprises are considered by banks to be risky due to their seasonality, insufficient financial histories, or lack of appropriate liability [52]. The works by Amraoui et al. [53] and Feudjo et al. [54] reflect the specifics of every country that affect choices of capital structure. The authors concluded that macroeconomic factors have no impact on the leverage levels of firms, so debt decisions are completely related to firms' specifics. Apart from the above-mentioned determinants, the size of a company represents a determinant that might have an impact on capital structure and is often synonymous with self-financing [55]. Additionally, the outcome of our research is similar to a study conducted by Khan [56], who also indicated *ROA* as an insignificantly important factor. Self-financing is also possible along the entire wood supply chain if enterprises implement

contemporary approaches for the production of wood-based products that can improve material management and production efficiency.

4. Conclusions

Overall, the analysis of the results obtained in this work presented many interesting features of the Czech, Slovak, and Bulgarian forest enterprises. Moreover, the results are valid both for enterprises operating entirely on a private basis and for enterprises supported or owned by the State. Firstly, the study found that, unlike in many other studies, return on assets (*ROA*) was not a significant factor in the capital structure of forest enterprises. This result can be considered as a characteristic of the investigated enterprises, which distinguishes them from many others. In addition, the forest enterprises in the studied countries formed individual specifics expressed as fixed effects of the coefficients of the regression equations. Unlike many other studies that look for specifics in the residues around the regression line, in our work, we found that forest enterprises form individual functional relationships between leverage and firm size. The appearance of the GDP as a statistically insignificant variable with high autocorrelation demonstrated the current independence of enterprises from their countries' macro-environments. The desire to maintain liquidity was found to have a negative relationship with leverage (0.105).

The Czech and Slovak enterprises were found to be more willing to borrow if the size is not big enough to cover the company's needs with equity. These enterprises engage in typical behaviours of private companies; if these enterprises do not manage to finance activities for forest steering with equity, their liabilities will increase. This is not the situation among Bulgarian enterprises, which can reduce deficits by acquiring state financing. These functional differences make the current analysis even more interesting and applicable because regardless of the nature of the enterprises, the factors of the financial structure are almost the same.

The present study provides a good basis for the implementation of further research on the capital structures of enterprises in the forestry sector within the studied countries. Future studies should be focused on improving the samples of enterprises and including related forest-based economic sectors, such as the wood-processing and furniture industries.

Author Contributions: Conceptualization, N.N. and S.K.; methodology, N.N. and S.K.; software, N.N.; validation, P.A., M.S., and A.-F.H.; formal analysis, R.S. and L.Š.; writing—original draft preparation, N.N. and S.K.; writing—review and editing, N.N. and S.K.; supervision, I.H.; project administration, N.N. All authors have read and agreed to the published version of the manuscript.

Funding: This study if funded by the Slovak Research and Development Agency under contracts No. APVV-18-0520, APVV-18-0378, APVV-17-0456, APVV-17-0583, APVV-20-0004, APVV-16-0297, KEGA 048ŽU-4/2022.

Data Availability Statement: Information for datasets generated during the study can be found at https://docs.google.com/spreadsheets/d/1gEiNo0A_l4-eEDXdC7stgRqhzmtJq93w/edit?usp=sharing&ouid=101292078080471014029&rtpof=true&sd=true, accessed on 10 January 2022 and https://docs.google.com/spreadsheets/d/1l_niPP7UIw-Ce0Q7omSwio63KgEVr04s/edit?usp=sharing&ouid=101292078080471014029&rtpof=true&sd=true, accessed on 10 January 2022. Information about data sources can be found at https://finstat.sk/ and https://portal.registryagency.bg/CR/Reports/VerificationPersonOrg, accessed on 10 January 2022.

Acknowledgments: The authors are grateful for the support of the Slovak Research and Development Agency under contracts No. APVV-18-0520, APVV-18-0378, APVV-17-0456, APVV-17-0583, APVV-20-0004, APVV-16-0297, KEGA 048ŽU-4/2022.

Conflicts of Interest: The authors declare no conflict of interest.

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