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IMPACT OF INTERNATIONALIZATION ON THE CAPITAL STRUCTURE OF COMMERCIAL COMPANIES

International enterprises (in this paper, international companies are understood as companies that sell their products and services abroad) are precious for the national economy because, through their experience in international sales, they stimulate the development of other companies in the same industry and their subcontractors. The knowledge that these companies have gained on international markets through the spillover effect spreads on their suppliers, as well as through imitation or cooperation on their competitors. Also, international companies (in the meaning: domestic export companies) are often the first to use new technological solutions and product innovations, which contributes to the modernization of products in the entire business sector. Dynamic and robust international companies usually also build networks with entities from different countries in order to cooperate on development, negotiation, and sales, which also encourages similar activities of their competitors. For all these reasons, national governments should take action to help to export companies, or at least monitor the problems that such entities report. The purpose of the publication is to draw attention to the higher demand for the debt that exists in such enterprises and to discuss the reasons for this. In particular, the purpose of the publication was to verify 2 research hypotheses: H1: Internationalization increases indebtedness of a company measured with the debt to equity ratio, and H2: The scale of internationalization (measured with the share of foreign sales to total sales) is positively related to the level of indebtedness (measured with the debt to equity ratio). For both hypotheses we found no grounds to reject these hypotheses. In the opinion of the authors, the demand for debt from exporters should be monitored, especially in terms of the availability of this form of financing for exporters from the SME sector. The paper used the Arellano-Bond model and data downloaded from the Orbis database for years 2007 – 2017.

Keywords: multinational companies, indebtedness, corporate finance, capital structure

JEL Codes: G32, C33, B17

Introduction

The purpose of the paper is to empirically verify the relationship between internationalization and the debt to equity ratio in commercial, non-financial companies. The literature review suggests that the direction of this relationship is not known, as there are as many publications that show that internationalization increases indebtedness ratios as there are publications that support the opposite opinion (that internationalization decreases debt levels in the capital structure). The paper attempts to empirically verify the direction of this relationship using large, representative samples of companies from four countries: Bosnia and Hercegovina, Ireland, France, and the United Kingdom.

Theoretical background

Research on the impact of internationalization on the company's capital structure seems to begin from the so-called classical models of capital structure, in particular from the Modigliani-Miller model¹ (the version which excludes taxes and bankruptcy costs), which was later augmented by Senbet² into a model which proved that in the absence of taxes and bankruptcy costs, capital structure does not affect the value of the international enterprises (that is, companies that operate in foreign markets).

Similar conclusions were drawn by Stiglitz³ who, however, pointed out that in imperfect markets there are at least three factors that create the relationship between the market value of a company and the capital structure: different interest rates on deposits and loans, changes in credit risk as the level of debt increases and the fact that bonds of different companies are not the same from the risk perspective.

The list of imperfections was extended by the work of Errunza and Senbet⁴, who added to it the following factors: the competition of a foreign company with domestic companies, which by definition contradicts the assumptions of a perfect market and the existence of entry barriers to foreign markets. In the opinion of researchers, these market imperfections must affect the capital structure of enterprises that enter foreign markets.

Another essential market imperfection is income taxes, which, according to the Black model⁵, not only affect the capital structure because of their existence but also because their effective rate is different in different countries. Black showed that the CAPM model does not work in such a world, and this disables a proper arbitrage between markets; international companies take advantage of that and operate at the lower average cost of capital than domestic companies. The same conclusions were drawn by Lee and Zechner⁶, who showed that in countries with high taxes the companies use more debt than in countries with low taxes. According to Shaked⁷, in the world of taxes, uncertainty of economic conditions and bankruptcy costs, international companies observe lower volatility of profits. This translates into lower costs of potential bankruptcy, which allows them to use higher debt ratios.

Another argument for the importance of internationalization in determining the capital structure and for the higher indebtedness of international companies was set forth

¹ F. Modigliani, M. Miller: The Cost of Capital, Corporation Finance and the Theory of Investment American Economic Review 48/1958, pp. 261-297.

² L.W. Senbet: International Capital Market Equilibrium and Multinational Firm Financing and Invest Policies, Journal of Financial and Quantitative Analysis 14/1979, pp.455-480.

³ J.E. Stiglitz: A Re-Examination of the Modigliani-Miller Theorem, American Economic Review 59/1969, pp. 784-793.

⁴ V.R. Errunza, L.W. Senbet: The Effect of International Operations on the Market Value of the Firm: Theory and Evidence, Journal of Finance 36/1981, pp. 401-417.

⁵ F. Black: International Capital Market Equilibrium with Investment Barriers, Journal of Financial Economics 1, 1974, pp. 337-352.

⁶ M.H. Lee, J. Zechner: Debt, Taxes, and International Equilibrium, Journal of International Money and Finance 3/1984, pp. 343-355.

⁷ I. Shaked: Are Multinational Corporations Safer? Journal of International Business Studies spring/2986, pp. 83-101.

by Lewellen⁸, Shapiro⁹ (1996), Chkir and Cosset¹⁰ (2001), Kedia and Mozumdar,¹¹ who claimed that international companies use debt to neutralize the political risk in a particular foreign country.

The list of imperfections which make international companies use different capital structure than domestic companies also includes agency costs, which according to Lee and Kwok¹² are higher for the international companies. This is because, being located in various countries, they are more challenging to control in terms of risk of wealth transfer from bondholders to shareholders. We assume that debtholders are risk-averse, and internationalization involves entering foreign markets, which is very risky. Therefore, it is advantageous for risk-preferring shareholders but not bondholders. According to Lee and Kwok¹³ (and also Doukas and Pantzalis¹⁴), this argument suggests that debt ratios should be lower for international companies. The same conclusions were formed by Myers¹⁵, Jensen and Meckling¹⁶ and Stulz¹⁷ who believed that assets of the international company are similar to the call option and being so risky they are not considered as suitable security for a debt, which reduces the amount of debt such companies are capable of borrowing. Jensen's¹⁸ paper provides counterargument to this opinion which is based on the free cash flow hypothesis: high agency conflicts should lead to higher debt ratios because debt mitigates agency conflicts by removing free cash flows from the disposal of the management, and this introduces external control every time management searches for funds in the market for new investment projects.

Even though the authors of the theoretical models discussed above do not agree on whether internationalization increases or decreases debt levels, their models agree about one thing: market imperfections make the value of international companies dependent on the capital structure. To provide more evidence about the direction of this relationship, we are going to analyze the empirical research results.

⁸ W.G. Lewellen: A Pure Financial Rationale for the Conglomerate Merger, *Journal of Finance* 26/1971, pp. 521-537.

⁹ A.C. Shapiro: Financial Structure and Cost of Capital in the Multinational Corporation, *Journal of Financial and Quantitative Analysis*, 13(2)/1978, pp. 211-226.

¹⁰ I.E. Chkir, J. Cosset: Diversification strategy and capital structure of multinational corporations, *Journal of Multinational Financial Management* 11/2001, pp.17-37.

¹¹ P.P. Kedia, A. Mozumdar: Foreign Currency Denominated Debt: An Empirical Examination, *Journal of Business*, 76(4)/2003, pp. 521-546.

¹² K. C. Lee, C.C.Y. Kwok: Multinational Corporations vpp. Domestic Corporations: International Environmental Factors and Determinants of Capital Structure, *Journal of International Business Studies*, 19(2)/1988, pp. 195-217.

¹³ K. C. Lee, C.C.Y. Kwok: Multinational ...,1988, pp. 195-217.

¹⁴ J.A. Doukas J. A., C. Pantzalis : Geographic diversification and agency costs of debt of multinational firms, *Journal of Corporate Finance* 9/2003, pp.59-92.

¹⁵ P.P.C. Myers: Determinants of Corporate Borrowing, *Journal of Financial Economics* 5/1977, pp. 147-175.

¹⁶ M. Jensen, W. Meckling: Theory of the firm: Managerial behavior, agency costs, and capital structure, *Journal of Financial Economics*, 3/1976, pp. 305-360.

¹⁷ R. Stulz: Managerial discretion and optimal financing policies, *Journal of Financial Economics* 26/1990, pp. 3-27.

¹⁸ M.C. Jensen: Agency Costs of Free Cash Flow, *Corporate Finance and Takeovers*, *The American Economic Review*, 76(2)/1986, May 1986, pp. 321-349.

Literature review

The positive relationship between internationalization and share of debt in the capital structure is suggested by works of the following authors:

- (1) Mansi and Reeb¹⁹ (US companies), Singh and Nejadmalayeri²⁰ (French companies) and Reeb et al.²¹ (US companies) who believe that internationalization opens the door for the currency risk, which increases the risk of investing in equity but at the same time allows geographical profit diversification which stabilizes the profits and lowers the cost of debt.
- (2) Kedia and Mozumdar²² (large American companies) who justified this relationship by the exposition to the currency and political risk and that one of the forms of protection against these risks is contracting on the markets' local (export) debt.
- (3) Heston and Rouwenhorst²³ (return on indexes of 12 European countries) and Agmon and Lessard²⁴ (US companies listed on NYSE). The authors suggested that higher indebtedness is due to lower bankruptcy risk through international diversification.
- (4) Singh et al.²⁵ (large US companies) who suggested that the share of debt increases with the size of the assortment and not with internationalization and that by controlling the size of the assortment, international companies have lower debt than domestic companies with the increase in the share of exports in sales.

A negative relationship between internationalization and the share of debt is suggested by the following authors:

- (1) Kim and Lyn²⁶ (research-based on international US companies) and Lee and Kwok²⁷ (international comparisons for 51 countries), who explained this dependency by the dissatisfaction of lenders with the increased risk of international companies and uncertainty of future cash flows.

¹⁹ P.P.A. Mansi, D.M. Reeb: Corporate diversification: what gets discounted?, *Journal of Finance* 57/2002, pp. 2167–2183.

²⁰ M. Singh, A. Nejadmalayeri: Internationalization, Capital Structure, and Cost of Capital: Evidence from French Corporations, *Journal of Multinational Financial Management* 14/2004, pp. 153-169.

²¹ D.M. Reeb, P.P.A. Mansi, J.M. Allee: Firm Internationalization and the Cost of Debt Financing: Evidence from Non-Provisional Publicly Traded Debt, *Journal of Financial and Quantitative Analysis* 36/2001, pp. 395–414.

²² P.P. Kedia, A. Mozumdar: *Foreign ...*, 2003, pp. 521-546.

²³ P.P.L. Heston, K.G. Rouwenhorst: Does Industrial Structure Explain the Benefits of International Diversification?, *Journal of Financial Economics* 36/1994, pp. 3–27.

²⁴ D.M. Reeb, P.P.A. Mansi, J.M. Allee, *Firm....* 2001, pp. 395–414.

²⁵ M. Singh, W.N. Davidson, J. Suchard: Corporate Diversification Strategies and Capital Structure, *Quarterly Review of Economics and Finance* 43/2003, pp. 147–167.

²⁶ W.S. Kim, E.O. Lyn: Foreign direct investment theories, entry barriers, and reverse investments in US manufacturing industries, *Journal of International Business Studies*, 18(2)/1987, pp. 53-67.

²⁷ K.C. Lee, C.C.Y. Kwok: Multinational Corporations vpp. Domestic Corporations: International Environmental Factors and Determinants of Capital Structure, *Journal of International Business Studies*, 19(2)/1988, pp. 195-217.

- (2) Chen et al.²⁸ (US companies), Doukas and Pantzalis²⁹ (US companies), Lee and Kwok³⁰, Michel, and Shaked³¹, Shapiro³² explained this relationship with high agency costs and high bankruptcy costs.
- (3) Ethier³³ (US companies) believed that low indebtedness was caused by high levels of intangible assets in international companies, which could not be used as a debt security.
- (4) Burgman³⁴ (US companies listed on NYSE) and Fatemi³⁵ (US companies) suggested that international companies have more investment opportunities than domestic companies, and this reduces conflicts over free cash flows, which are retained in a company and used for new projects. This reduces the need to take out new loans.
- (5) Kwok and Reeb³⁶ (32 countries, including 12 emerging markets) formulated the hypothesis that the relationship between internationalization and capital structure depends on the relationship between three types of risk: the risk of a given international company, the risk of operating in the country of origin of the international company, and the risk of countries to which the international company sends its goods. If the risk on the domestic market is higher than on foreign markets (and an international company), then internationalization will increase the level of debt. If the risk on the domestic market is lower than foreign markets (and the risk of an international company), then the debt will decrease. The results of Kwok and Reeb³⁷ confirmed the negative correlation between internationalization and debt for US companies (as opposed to the results of the research and Chen et al.³⁸, Chkir and Cosset³⁹), but also indicated that especially for companies from developing markets, the higher the company's involvement in foreign sales, the higher its debt will be.
- (6) Low and Chen⁴⁰ (2004, 30 countries) confirmed the lower indebtedness of international US corporations; however, they failed to find this relationship for companies from other countries.

²⁸ C. J.P. Chen, C.S.A. Cheng, J. He, J. Kim: An Investigation of the Relationship between International Activities and Capital Structure, *Journal of International Business Studies*, 28(3)/1997, pp. 563-577.

²⁹ J.A. Doukas, C. Pantzalis: *Geographic ...*, 2003, pp.59-92.

³⁰ K.C. Lee, C.C.Y. Kwok: *Multinational ...*, 1988, pp. 195-217.

³¹ A. Michel, I. Shaked: *Multinational Corporations vs. Domestic Corporations: Financial Performance and Characteristics*, *Journal of International Business Studies*, 17(3)/1986, pp. 89-100.

³² A.C. Shapiro: *Financial ...*, 1978, pp. 211-226.

³³ W. J. Ethier: *The Multinational Firm*, *Quarterly Journal of Economics* 101/1996, pp. 805-834.

³⁴ T.A. Burgman: *An Empirical Examination of Multinational Corporate Capital Structure*, *Journal of International Business Studies*, 27(3)/1996, pp. 553-570.

³⁵ A.M. Fatemi: *The Effect of International Diversification on Corporate Financing Policy*, *Journal of Business Research*, 16(1)/1988, pp. 17-30.

³⁶ C.C.Y. Kwok, D.M. Reeb: *Internationalization and Firm Risk: An Upstream-Downstream Hypothesis*, *Journal of International Business Studies*, 31(4)/2000, pp. 611-629.

³⁷ C.C.Y. Kwok, D.M. Reeb : *Internationalization...* , 2000, pp. 611-629.

³⁸ C.J.P. Chen, C.S.A. Cheng, J. He, J. Kim: *An Investigation ...* , 1997, pp. 563-577.

³⁹ I.E. Chkir, J. C. Cosset: *Diversification ...* , 2001, pp.17-37.

⁴⁰ P.Y. Low, K.H. Chen: *Diversification and Capital Structure: Some International Evidence*, *Review of Quantitative Finance and Accounting*, 23(1)/2004, pp. 55-71.

As one can see from the publication summary, empirical research also does not give definite answers about the direction of the dependency between internationalization and the level of debt. Some authors provide evidence that it is positive, other authors believe that it is negative. Finally, Kwok and Reeb⁴¹ suggested that the relationship is conditional and dependent on the risk differences between countries. This is why we, the authors of this paper, decided to check for the direction of this relationship using a newer data sample, which covered the years 2007 – 2017.

Research method

The selection of the model used for estimating the empirical relationship between internationalization and indebtedness included the following observations and conditions:

- Dependent and independent variables were auto-correlated, which required a model which deals with this problem and produces unbiased estimators of model coefficients;
- The model must allow for the partial adjustment of the endogenous variables over time (due to their autocorrelation);
- Specific characteristics of companies remain constant over time – for example, the industry or company size;
- The model should produce correct estimators for a limited data sample;
- Individual effects should include omitted variables;
- The expected relationship is linear;
- The model should be able to manage auto-correlation and heteroscedasticity inside objects, but not between them;
- idiosyncratic errors are not correlated between objects;
- variables used in the model are stationary.

Described characteristics led to the implementation of the Blundell-Bond model, as it deals well with variables that are not perfectly stationary, and with auto-correlated variables. It also produces good estimators for small samples and works well with weak instrumental variables.

To select the best model for the data, we used the bootstrap technique, which meant that we estimated numerous models with all possible combinations of variables from variables groups (variables were strongly correlated within these groups and not significantly correlated between these groups) and chose the model with the highest predictive power. The majority voting of models also allowed to determine the relationship between debt levels and internationalization. We rejected models where control variables (variables which impact on capital structure and are known and are not questionable) had coefficients suggesting the dependency in the opposite direction.

Data was cleared of outliers by removing observations that were higher or lower by two standard deviations from the mean. It was necessary because the model we used is not resistant to such outliers. The method of two-stage estimation with resistant residues was used. Hence we did not run the Pearson test but only Arellano-Bond.

The overall form of the model was as given in equation 1:

⁴¹ C.C.Y. Kwok, D.M. Reeb: Internationalization ... , 2000, pp. 611-629.

$$DE_{it} = \sum_{k=1}^K \gamma_k DE_{it-k} + \beta^T x_{it} + \alpha_i + \varepsilon_{it} \quad (1)$$

where x_{it} are explanatory variables, α_i – group effects, $\varepsilon_{it} \sim IID(0, \sigma_\varepsilon^2)$ – residual errors, i – object number, t – period, k – time-delays, DE – debt to equity ratio.

Among exogenous variables (which are discussed below) there was either the discrete variable that identified which company (object) was an international or the variable which represented the foreign sales share in total sales revenues. We wanted to empirically verify whether foreign sales variables had a significant impact on the indebtedness ratio.

Table 1 shows the groups of variables used to estimate the model; each group represents another potential determinant of a company's capital structure (a Table with a variable summary is presented in Appendix 1).

1. Debt measures represent different attempts to measure the dependent variable, which is the capital structure of a company. We tried using the following variables: $DEBT_A$ (liabilities divided by total net assets), $DEBTOR$ (binary variable assuming one if the level of debt in the enterprise exceeds 80%), $INDEBT_ST$ (relation of short-term liabilities to long-term liabilities), LT_LT_A (relation of long-term interest liabilities to total assets), LT_ST_A (relation of short-term interest liabilities to total assets), $NONINTERESTLIAB_A$ - share of trade liabilities in total (net) assets.

Due to the strong relationship between current debt ratios and their values from the previous period (enterprises' decisions as to the form of financing strongly depend on the current capital structure and amount of debt), delayed debt ratios (respectively) were introduced as independent variables: $DEBT_A_t_1$, $DEBTOR_t_1$, $INDEBT_ST_t_1$, $LT_LT_A_t_1$, $LT_ST_A_t_1$, DE_3 (average for the last 3 years), $DEBT_A_3$, $DEBTOR_3$, $INDEBT_ST_3$, $LT_LT_A_3$, $LT_ST_A_3$.

2. Internationalization was measured with the following variables: $EXPORT_OPERREVENUE$ which measures the intensity of foreign sales, $EXPORTER$ which is a binary variable and distinguishes international companies from domestic companies, $EXPORT_100$, $EXPORTFROM50$, $EXPORTFROM25$, $EXPORTFROM10$ distinguished companies with international sales share close to 100 %, above 50%, 25% and 10% of total sales.

3. Productivity was measured with the following variables: $PRODUCTIVITY$, which represented the residuals from the production function, $EQUIPMENT$, which measured the number of net fixed assets per employee, $PRODUCTIVITY_A$ and $PRODUCTIVITY_E$ which measured sales related to fixed assets and sales divided by the number of employees. A negative correlation between productivity and debt was expected.

4. Profitability measures which included: $ROSF$ - return on equity, ROA - return on assets, ROE - equity, $ROSF$ - share capital, ROS - return on sales, $ROSF_3$, ROE_3 , ROA_3 is the average for the last three years. We expected a negative correlation between profitability and debt.

5. Liquidity measures included the following variables: $CURR$ – current liquidity ratio, CF_S – average balance of cash flows for the last 3 years divided by sales, $SUFFICIENCY$ a binary variable which indicated the company's ability to cover the most essential expenses (dividend estimation, purchases of fixed assets, repayment of

loans) from operating cash surplus. The group of liquidity ratios has been supplemented with ratios measuring the length of the operating cycle because they are considered to be an extension of the entity's liquidity analysis: CKON net working capital cycle, inventory, liabilities, and receivables cycle: STOCKCYCLE, CREDITCYCLE, and COLLECTIONPERIOD.

6. Credit collateral. Ratios from this group measure the share of non-current assets in total assets, as non-current assets are used to secure long-term loans and interest liabilities. Therefore, this group included the following indicators: the share of non-current assets in total assets AT_A, the share of non-current assets in total assets ATR_A, the share of tangible assets in total assets (part of current assets has been added here). Additionally, the interest coverage ratio INTEREST_COVER calculated as an operating result related to interest was used.

7. Development possibilities. The entity's debt also depends on the development opportunities available on the market. In industries where there is no innovation, there is usually intense price competition that reduces profits, and this often makes companies unable to repurchase depreciated assets, and companies must use debt. On the other hand, excellent development opportunities increase the costs of bankruptcy and are, to some extent, a guarantee that bankruptcy will not happen, which positively affects the possibility of obtaining debt. Therefore, the possibility of a non-linear relationship between debt and investment opportunities was adopted. The following variables were used as measures of development possibilities: DEVELOPMENT which reflects the available sources of self-financing (for the previous period), TEMPOS variable measuring the rate of sales change (annual change), chngFA_A measures the level of investment in fixed assets, REINVESTMENT shows how much profit the company retained for future development.

8. Tax shields. Tax shields have a positive or negative impact on increasing debt, depending on whether the interest shield or non-interest shields are analyzed. In the case of interest shield (SHIELD_INT), its amount is positively related to debt. The opposite is true for other shields: advertising, depreciation, provisions (SHIELD_ADV, SHIELD_PROV, SHIELD_INT).

9. Size of the entity was measured with the following variables (the larger the company, the more secure it is and the more debt it can use): SIZE, i.e., the natural logarithm of employment, EMPLOYEES – employment in persons, OPERREVENUE – the company's logarithm of sales measured in euros.

10. The risk was measured with the following variables: devEBITDA, devEBITDAI, devOPERREV, devCASHFLOW, which mean, respectively: standard deviation of profits without depreciation, taxes, and interest; profits without depreciation, taxes, interest and capital expenditures, turnover and operating flow balances. Also, we used ratios measuring the degree of operational and financial and total leverage (DOL1, DFL1, DFL, DTL). On top of that, we used the results of the following bankruptcy prediction models: ZSCORE, EMSCORE, TAFFLER, CBBF1, and INSOLVENCY2.

11. Position in the industry. The company's profitability is determined by the industry situation and the uniqueness (perceived by customers) of the company's offer. Therefore, companies with a better position in the industry receive funds more easily from lenders, which leads to the assumption of a positive relationship between a strong position in the industry and market monopolization and debt. The following variables

were adopted as measures of position in the industry: MARKETSHARE, i.e. the share of turnover of a given enterprise in the total turnover of companies from a given sector, HERFEXP, H2, H3, H4 – which means respectively the Herfindahl-Hirsch index for exporters (industry-specific), for all companies grouped in industries according to 2, 3.., digit nace code, COMPETITORS – the number of direct competitors listed in the Orbis database.

12. Corporate transformations. During corporate mergers and transformations, financial indicators of companies lose comparability and rationality. Therefore, we introduced a binary variable to signal such situations.

13. Age of the entity because usually, the level of debt increases with the age of the company. Therefore, we used the variable: AGE representing the age of the company.

14. Control and possession. The variables in this group are based on the theory of conflicts between shareholders, lenders, and management. One of the measures of the level of these conflicts is the amount of free cash flow at the disposal of the management board and the dividend, which reduces the free cash flow. It is assumed that the higher the dividend, the lower the conflicts, and the higher the entity's debt will be (variable CONTROL). Other research suggests that in private companies, the debt is higher than in state-owned companies, hence the PRIVATE variable introduced, which takes the value 1 for private companies and 0 for state-owned companies.

15. Development of the financial sector and technological advancement of the economy. According to the results of earlier studies, the worse the economic situation in a given country's economy, the higher the average indebtedness of enterprises (due to the decrease in profitability). Therefore we used the following variables describing the macroeconomic situation in a country: RECESSION (takes the value of 1 if there was a decrease in real GDP year on year in), GDPREALGROWTHRATE (measures the change of real GDP year on year), PUBDEBT measures the level of public debt to GDP, INTEREST measures the level of interest rates in the country (the lower it is, the higher will be the enterprise's debt). The measures of the country's economic development included: the existence of a stock exchange (STOCKMARKET = 1 if there is a stock exchange in a given country) and GDPPERCAPITA showing the level of GDP per capita in the country. A positive relationship was expected between the level of development and the level of debt (due to lower risk).

16. Cost of capital. We expected a positive relationship between the level of debt and the cost of equity (variable RISKPREMIUM) and a negative relationship between the debt and the cost of debt (variable KD). We also tested the general level of interest rates (the variable INTEREST_RATES).

17. Artificial variables distinguished various types of business activities in which companies operated (NACE), forms of ownership (private or state-owned company), and the INDEPENDENT variable distinguished companies which had subsidiaries (or not).

The data sample we used was downloaded from the Orbis database and included unconsolidated and consolidated financial statements of commercial companies. If a company was a part of a bigger group, we only used the financial statement of the holding. We removed all observations where total assets were not equal to equity plus liabilities, and we removed outliers. The selection of countries depended on the availability of export sales information in the database. The data covered the period 2007 – 2017.

The estimated models were to verify the following research hypotheses:
H1: Internationalization increases indebtedness of a company measured with the debt to equity ratio,
H2: The scale of internationalization (measured with the share of foreign sales to total sales) is positively related to the level of indebtedness (measured with the debt to equity ratio).

Results

The results of model estimation for four (BA – Bosnia and Herzegovina, FR – France, UK – the United Kingdom and IR – Ireland) countries are presented in Table 1 and Table 2. Table 1 shows the basic model parameters. The number of groups represents the number of companies that were used for the estimation. The number of observations is the total number of observations because every company's financial statements could be given for more than one year. The number of instruments represents the number of second and further lag differences of variables that were used in the estimation of the model (they have to be independent on the residuals). Wald chi2 statistic shows the result of the test based on the MLE estimators for the model with and without constraints (“a model with constraints” means that we remove all independent variables from the model and comparative predictive power of both models – with and without independent variables) and the prob>chi2 statistic shows the probability that this difference is statistically significant. The next two lines represent the Arrelano-Bond test for the absence of the second-order serial correlation in disturbances – if the hypothesis is not rejected, then there is no serial correlation. Since p-values > 0.05 then there is no serial autocorrelation (z-value represents the value of the test statistic). We used the two-step robust estimation with the Windmeijer’s finite-sample correction for the two-step covariance matrix (we had to use robust estimation).

Table 1. Model estimation parameters for the dependency between debt to equity ratio and a binary variable representing international companies

country	BA	FR	UK	IR
no of obs	5258	14807	1618	160
no of groups	1350	3602	870	98
no of instruments	33	33	35	26
Wald chi2(4)	102.04	2055.66	476.59	60.95
Prob>chi2	0	0	0	0
abond2 z-value	-0.76	-0.14	-0.47	-0.56
abond2 p-value	0.45	0.89	0.64	0.58

Source: Authors’ own research.

Table 2 shows parameters of the model in which we wanted to find the relationship between the debt to equity ratio and the discrete variable which determines whether a company has more than 10% of its sales as foreign sales (variable exporter) (less than 10% of export sales could result from random, unplanned transactions with foreign companies operating in the domestic market).

As can be seen in Table 1 and 2, estimated parameters confirm the positive dependency between indebtedness and internationalization. Statistically significant

determinants included: a binary variable identifying firms with foreign sales exceeding 10% of total sales revenues, the cost of debt (negative dependency), bankruptcy risk measured with bankruptcy prediction models (negative dependency), total asset productivity (negative dependency), growth of fixed assets in total assets (positive dependency), return on equity and return on sales (negative dependency), growth rate of sales (positive dependency) and the size of a company (positive dependency). Therefore, the model confirmed that selling more than 10% of sales abroad has a positive impact on the indebtedness of a company.

Table 1. Model estimation results for the dependency between debt to equity ratio and a binary variable representing international companies (dependent variable DE_t)

Country/variable name	BA	FR	UK	IR
DE_t_1	L1.DE	L1.DE	L1.DE	L1.DE
estim	0.75	0.67	0.55	0.45
z	8.61	25.68	8.04	3.37
p	0,001	0,001	0,001	0.007
DE_t_2		L2.DE		
estim		0.05		
z		3.79		
p		0,001		
FOREIGNSALES	exporter	exporter	exporter	exporter
estim	7.10	0.15	0.03	0.06
z	2.01	1.86	2.74	1.80
p	0.04	0.06	0.01	0.07
INSOLVENCY			EMScore	EMScore
estim			-0.05	-0.01
z			-9.95	-3
p			0,001	0.003
CAPITAL	kd	kd	kd	
estim	-1.85	-0.001	-0.001	
z	-2.10	-3.43	-5.23	
p	0.04	0.001	0.001	
TFP	productivity a	productivity a		
estim	-5.62	-0.04		
z	-1.97	-6.29		
p	0.05	0,001		
GROWTH		chgFA a	chgFA a	
estim		0.14	0.10	
z		9.79	2.6	
p		0.001	0.01	
PROFITABILITY	roe	cf_s		
estim	-20.72	-0.09		
z	-3.11	-6.79		
p	0.001	0,001		
TEMPO				f1.tempos
estim				0.09
z				1.90
p				0.06
SIZE			size_s	
estim			0.04	
z			2.06	

Country/variable name	BA	FR	UK	IR
p			0.04	
CONS	cons	cons	cons	cons
estim	10.97	0.08	0.26	0.29
z	2.64	1.68	1.42	3.51
p	0.01	0.09	0.16	0.001

Source: Authors' own research.

Tables 3 and 4 show the results of the model estimation, where one of the explanatory variables was the share of foreign sales in total sales revenues. If such a relationship exists, then for moderately indebted companies, the share of debt could depend on the level of their internationalization. As can be seen in Table 3, the AR(2) test did not show serial autocorrelation.

As can be seen in Table 4, although it could be the effect of using a large data sample, estimation results confirm the positive relationship between the level of internationalization (measured with the share of foreign sales in total sales) and the indebtedness of a business. Statistically significant determinants included (on top of the share of foreign sales in total sales ratio): the risk of bankruptcy (negative dependency), the cost of debt (negative dependency), total assets productivity (negative dependency), increase of fixed assets in total assets (positive dependency), current liquidity ratio (positive dependency), return on equity (negative dependency), interest rates (negative dependency) and the growth rate of sales (positive dependency). The estimated models (at least) did not deny the possibility that the scale of internationalization may be linearly related to the indebtedness level of a company.

Table 3. Model estimation results for the dependency between the debt to equity ratio and the foreign sales share in total sales

country	BA	FR	UK	IR
no of obs	10889	282345	1618	164
no of groups	3557	60002	870	51
no of instruments	31	33	33	34
Wald chi2(4)	3322.76	214.66	516.2	149.23
Prob>chi2	0	0	0	0
abond 2 z	1.05	0.81	-0.64	-0.02
abond 2 p	0.29	0.42	0.52	0.99

Source: Authors' own research.

Table 4. Model estimation results for the dependency between the debt to equity ratio and the foreign sales share in total sales (dependent variable DE_t)

country	BA	FR	UK	IR
DE_t_1	L1.DE	L1.DE	L1.DE	L1.DE
estim	0.83	0.46	0.50	0.10
z	44.09	1.99	6.31	1.94
p	0	0.047	0	0.052
DE_t_2	L2.DE			
estim	0.04			
z	2.31			
p	0.02			
FOREIGNSALES	export_operrevenue	export_operrevenue	export_operrevenue	export_operrevenue

country	BA	FR	UK	IR
Estim	0.03	0.012	0.07	0.10
z	3.43	2.5	1.75	1.94
p	0.001	0.012	0.08	0.05
INSOLVENCY			EMScore	
estim			-0.55	
z			-7.9	
p			0	
CAPITAL			kd	
estim			-0.001	
z			-2.61	
p			0.009	
TFP		productivity a		
estim		-1.67		
z		-3.78		
p		0		
GROWTH		chgFA a	chgFA a	
estim		8.58	0.10	
z		3.29	2.6	
p		0.00	0.01	
LIQ		curr		
estim		0.03		
z		2.47		
p		0.01		
PROFITABILITY	roe	roe		roe
estim	-0.46	-2.93		-0.21
z	-21.95	-4.16		-1.78
p	0	0		0.08
MACRO	interest rates			
estim	-0.08			
z	-4.61			
p	0.00			
TEMPO				tempos
estim				0.05
z				1.62
p				0.11
CONS	cons	cons	cons	cons
estim	0.14	6.05	0.72	0.21
z	6.85	3.23	7.36	5.37
ap	0.00	0.00	0.00	0.00

Source: Authors' own research.

As can be seen in Table 2 and 4, and as was expected, the models proved a strong negative relationship between profitability and indebtedness and a positive dependency between the indebtedness and growth of fixed assets (investing). High productivity also decreases indebtedness. We assumed a linear dependency between variables because the quadratic form and cubic form of independent variables did not improve the parameters of the model.

Conclusions and recommendations

The empirical findings of this paper did not provide grounds that would make us reject the research hypotheses we put in this paper. Models that we estimated confirmed that internationalization increases indebtedness of a company measured with the debt to equity ratio (H1 hypothesis) and that the scale of internationalization (measured with the share of foreign sales to total sales) is positively related to the level of indebtedness (measured with the debt to equity ratio) (H2 hypothesis).

Regardless of whether companies we analyzed come (in the meaning: have their headquarters) from an economically developed country or a developing country, if one excludes over-indebted enterprises, all research results show that the companies increase their level of debt along with their level of internationalization. Possible reasons for this situation can be found in theoretical studies presented at the beginning of the article. These reasons include lower operational risk of international enterprises resulting from geographical sales diversification, higher product attractiveness, and brand strength, which allows the company to sell its products on international markets, lower risk, and costs of bankruptcy of international enterprises. Additional reasons that may cause an increase in debt, according to the authors of this study, include: better quality of assets used as collateral for loans, higher sales dynamics forcing additional annual increases in funding necessary to cope with the increase in net working capital demand, greater availability of attractive investment projects and lower risk of their failure, because enterprises able to survive in foreign markets have extensive knowledge and experience in implementing such projects. Also, according to signaling theory, if a company implements very attractive investment projects with relatively low risk, it would try to finance them with debt, because it does not risk defaulting on this debt, and limits the claims of capital donors to the amount of interest and loan installments. The market responds positively to such situations, and therefore such actions increase the value of the company.

Government policy recommendations resulting from these observations are such that enterprises entering foreign markets and increasing their share in such markets need large amounts of capital, and although they should deal with its acquisition on their own, it is worth talking with banks about possible problems with providing them with additional financing. Especially small and medium-sized entities, which generally have problems with obtaining financing, may suffer from a lack of capital. There are opinions that the situation of capital shortage cannot be observed using empirical data, because enterprises that lack capital do not invest, and therefore the only thing that can be seen in the empirical data is the slow pace of development.

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Annex 1. Variables used for the model construction (summary)

variable	formula	direction	group
de	Total debt / equity	x	indebtedness
debt_a	(long-term liabilities + short-term liabilities) / assets	x	
debtor	1 if debt/assets > 80%	x	
INDEBT_ST	short-term liabilities / long-term liabilities	x	
LT_LT_a	Long-term debt / assets	x	
LT_ST_a	Short-term debt / total assets	x	
de_t_1	DE ratio delayed by 1 year	x	
debt_a_t_1	DEBT_A delayed by 1 year	x	
debtor_t_1	DEBTOR delayed by 1 year	x	
INDEBT_ST_t_1	INDEBT_ST delayed by 1 year	x	
LT_LT_a_t_1	LT_LT_A delayed by 1 year	x	
LT_ST_a_t_1	LT_ST_A delayed by 1 year	x	
DE_3	Average DE for 3 years	x	
debt_a_3	Average DEBT_A for 3 years	x	
debtor_3	Average DEBTOR for 3 years	x	
INDEBT_ST_3	Average INDEBT_ST for 3 years	x	
LT_LT_a_3	Average LT_LT_A for 3 years	x	
LT_ST_a_3	Average LT_ST_A for 3 years	x	
export_operrevenue	Foreign sales / net sales revenues	+	internationalization
exporter	EXPORTER = 1 if foreign sales / sales > 10%	+	
export_100	EXPORT_100=1 if foreign sales / sales > 95%	+	
export50	EXPORT_50 = 1 if foreign sales / sales > 50%	+	
export25	EXPORT_25 = 1 if foreign sales / sales > 25%	+	
export10	EXPORT_10 = 1 if foreign sales / sales > 10%	+	
no_export	NO_EXPORT=0 if foreign sales / net sales revenues < 10%	+	
productivity_a	Sales / fixed assets	-	productivity
productivity_e	Sales / employment	-	
TFP	Change of multifactor productivity calculated as productivity dynamics ratio between 2 years and productivity was calculated as the Cobb-Douglas function residuals	-	
equipment	Fixed assets/employment	-	profitability
rosf	Net financial profit/shareholders' funds	-	
roe	net financial profit/equity	-	
roa	Net financial profit/total assets	-	
ros	Net financial profit/sales	-	
rosf_3	Average ROSF for 3 years	-	
ros_3	Average ROS for 3 years	-	
roe_3	Average ROE for 3 years	-	
roa_3	Average ROA for 3 years	-	
curr	Current assets / current liabilities	-	liquidity
cf_s	Average operating cash flows for 3 years / sales	+/-	
sufficiency	(dividend + fixed assets change + bank loans / 20 + interest) / net operating cf	+/-	
ckon	Days in receivables + days in inventories – days in payables	+/-	

variable	formula	direction	group
creditperiod	(short-term trade payable) * 360 / turnover	+/-	
stockcycle	inventories * 360 / turnover	+/-	
collectionperiod	(short-term trade receivables) * 360 / turnover	+/-	
at a	Fixed assets / total assets	+	Debt security
atr a	Fixed assets / total assets	+	
ar a	(fixed assets + 0,5*inventories+0,5*receivables)/total assets	+	
Interest_cover	EBIT/interest	+	
Interest_cover_t_1	Interest_cover delayed by 1 year	+	
rozwoj	Net operating cash-flow/total assets	+/-	development
tempos	The percentage growth rate of sales	+/-	
chnghFA A	Annual change of fixed assets / total assets	+/-	
reinvestment	Annual change of equity / net financial profit	+/-	
shield_res	Income tax/gross profit * provisions	-	fin shields
shield_int	Income tax / net financial profit * interest	+	
shield_a	Income tax / net financial profit * depreciation	-	
size	Natural logarithm of employment	+	Size
employees	Number of employed persons in a company	+	
size	1 for small companies, 2 for medium companies, 3 for big companies i 4 for large companies	+	
operrevenue	Natural logarithm of operating revenue (in thousands of euros)	+	risk
devebitda, sdebitda	Standard deviation of EBITDA	+/-	
devebitdai, sdebitdai	The standard deviation of EBITDA minus change of fixed assets	+/-	
devoperrev, sdoperrev	Standard deviation of turnover	+/-	
sdcashflow	the standard deviation of net operating cash flows	+/-	
dfl	(non-operating liabilities + bank loans) / equity	+/-	
dfl1	Percentage change of gross profit/percentage change of EBIT	+/-	
dol1	Percentage change of EBIT / percentage change of sales	+/-	
dtil	sales / net profit or loss	+/-	
EMScore	$EMScore=6.56*kon/totalassets+3.26*change_sharefunds/totalassets+6.72*ebit/totalassets+1.05*sharefunds/(totalassets-sharefunds)+3.25$	-	
Zscore	$Zscore=0.717*(currassets-curriab)/totalassets+0.847*(sharefunds[_n]-sharefunds[_n-1])/totalassets+3.107*ebit/totalassets+0.42*sharefunds/(totalassets-sharefunds)+0.998*sales/totalassets$	-	
CBBF1	$CBBF1=-1.255*interest/EBITDA+2.003*sharefunds/totalassets-0.824*(plbeforetax+depreciation)/totalassets+5.221*plbeforetax/operatingrevenue-0.689*creditperiod-1.164*((operatingrevenue-employeescosts-materialcosts)/(operatingrevenue[_n-1]-employeescosts[_n-1]-materialcosts[_n-1]))+0.706*collectionperiod+1.408*(fixedassets[_n]-fixedassets[_n-1])/(operatingrevenue-employeescosts-materialcosts)-85.544$	-	
Taffler	$Taffler=0.53*plbeforetax/curriab+0.13*currassets/(totalassets-sharefunds)+0.18*curriab/totalassets+0.16*ebit/totalassets$	-	
insolvency2	$UPADLOSC = current\ ratio * 0.365425 + (current\ assets - inventories)/current\ liabilities * -0.765526 + liabilities/assets * -2,40435 + net\ working\ capital / total\ assets * +1,59079 + days\ in\ receivables * +0,00230258 + days\ in\ inventories * -0,0127826 + 2,36261$	-	

variable	formula	direction	group
herfexp	Herfindahl-Hirschman index calculated for foreign sales for companies with the same 3 NACE digits	+	Market share/position
H3sales	Herfindahl –Hirschman index based on sales (calculated separately for every country) for 3-digit NACE subgroups	+	
H4sales	Herfindahl –Hirschman index based on sales (calculated separately for every country) for 4-digit NACE subgroups	+	
marketshare	Net sales revenues of a company / total sales in the industry	+	
competitors	Number of direct competitors	-	
korp	KORP = 1 if fixed assets grew by more than 100% or current ratio grew by 100%	+	M&A
age	Company's age		age
control	Share of dividends in net financial profit calculated as changes in equity without share capital/net financial profit	+	control
private_owned	1 for non-state owned companies	+	ownership
banks	Bank sector total assets / GDP	+	Financial sector
bankloans_pkb	Household loans / GDP	+	
deterioration	1 if real GDP decreased	+	economic situation in a country
gdprealgrowthrate	the real growth rate of GDP	+	
pubdebt	gross public debt / GDP	+	
interest_rates	Risk free rate in a country of a company's headquarters	-	
stockmarket	1 if there exists a stock market in the country of a company's headquarters	+	
gdpper capita	GDP per capita	+	cost of capital
kd	Cost of debt = interest / debt	-	
riskpremium	Risk-free rate in a country of a company's headquarters	+	
status	Active 1; Inactive (no precision) 2; Active (dormant) 3; Dissolved (merger) 4; Dissolved 5; Bankruptcy 6; Inactive (no precision) 7; In liquidation 8; n.a. 0		
nace, nace3	3 and 4-digit NACE code		
czas	year		
dependent	1 if a company owns subsidiaries and 0 if a company does not have subsidiaries		

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