Determinants of Capital Structure: Evidence from Polish Food Manufacturing Industry

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Abstract

The aim of this paper is to identify factors influencing the capital structure of Polish food manufacturing companies. In the first part of the paper, the most probable determinants of the capital structure have been identified on the basis of literature review and the current research conducted in this field. The second part of the paper presents an empirical verification of the relationship between capital structure and its fundamental determinants. The study was made using panel models. The scope of the survey covered Polish food companies between 2012 and 2015.

Key determinants of total debt in the food manufacturing companies include: share of fixed assets in total assets, liquidity, profitability and non-debt tax shield with negative relationship. These factors also include: business size and growth with a positive relationship. For the long-term debt, the following factors are important: share of fixed assets in total assets, size of the business and liquidity (positive relationship). A negative relationship has been diagnosed for profitability and non-debt tax shield. The identified factors and the direction of dependence are similar to those previously diagnosed in the Czech Republic and Italy. However, they differ significantly from those of the US and Turkey.

The capital structure of Polish food enterprises, measured by the total debt ratio, is best explained by the pecking order theory, while the share of long-term debt in the capital structure can be explained by static trade-off theory.

Key Words

capital structure; determinants of capital structure; Polish food manufacturing industry

1 Introduction

Decisions on selecting a source of funding are crucial for any organization. The capital structure thus created is a determinant of the cost of capital, and also the risk associated with its management. From this point of view, the studies on determinants of the capital structure are a key cognitive issue in corporate finance.

One of the ideas expressed in the literature is the belief that decisions regarding the capital structure depend on two groups of factors. The first group is related to the characteristics and organization of the enterprise, its functioning model and the effects of its business operations. These internal factors include broadly understood relations between assets, sources of financing, revenues and costs, as well as the results achieved. The nature of the influence of internal factors on the enterprise indebtedness is explained by the capital structure theories broadly described in the literature on the subject matter.

The second group of capital structure determinants consists of external factors resulting from the macroeconomic and institutional conditions of the environment in which enterprises operate. The literature on the subject matter points out the country-specific and industry-specific factors as the main determinants of this type (DE JONG et al., 2008; KAYO and KIMURA, 2011). Most of the mentioned studies pointed out, that external factors affect the enterprises' capital structure indirectly – through moderating internal factors. At present, a research direction which is dynamically developing aims at finding internal factors which can affect capital structure in a particular country and industry. This study is grounded in that particular research area. The aim of this paper is to identify internal factors that may influence decisions on the capital structure of Polish companies operating in the food manufacturing industry.

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The food manufacturing industry, as well as the agricultural sector, produces primary products with a more inelastic demand in the situation of turbulent conditions in the economy. In addition to the seasonality of production, the dependence on natural and political circumstances, unfavourable price trends and relatively low profitability of food production may cause a decrease in investment of the food manufacturing companies. In turn, the investment is the main cause of seeking new financing sources. For this reason the food manufacturing industry is characterised by high price volatility and a pro-cycle nature of investments. This contributes to the specific capital structure of companies in this sector.

The food manufacturing industry plays an increasingly important role in global trade and European food markets. This particular industry is characterised by high market saturation and a strong competition (BUCHENRIEDER et al., 2009; ZOUAGHI and SÁNCHEZ, 2016). The explanation of these characteristics must include the demand and supply factors of each country and the EU policy itself (COYLE et al., 1998). The demand level and its composition are related to income per capita, changes in income elasticity and patterns of trade (GOPINATH and CARVER, 2002). What is more, the food manufacturing industry includes a broad range of protagonists — from farmers to retailers and consumers as well as the food manufacturing companies themselves.

The food manufacturing industry in Poland is one of the largest branches of the economy. At the same time, this industry is very heterogeneous. It accounts for 415,000 employees in 11 different subsectors (in 2014) (GUS, 2015). In this regard, the food manufacturing industry generates almost 15% of employment in the overall manufacturing sector in Poland. Furthermore, the share of the food manufacturing industry in the total production structure in Poland amounts to 6.2% (POCZTA and BEBA, 2014).

Our literature review indicates that studies on the capital structure of enterprises in the Polish food manufacturing industry have not exceeded beyond the initial exploration phase so far. This research has been already developed in other countries such as the USA, Italy, Turkey and Czech Republic. In this respect, the following research questions can be formulated:

(Q1)   Which of the internal factors described in the theories affect the indebtedness of enterprises in food manufacturing industry in Poland?

(Q2)   What is the direction and strength of this influence?

(Q3)   Which capital structure theory best explains financial decisions of the mentioned enterprises?

(Q4)   What are the similarities and differences in the characteristics of the identified determinants of capital structure in comparison to other industries in Poland and food manufacturing industries in other countries?

The first part of the paper presents the literature review. The most important determinants that influence the financial decisions of companies with a particular focus on the industry-specific study are identified. Subsequently, the studies on the capital structure of food manufacturing companies are described and analysed. The second part of the paper provides our own empirical research in which the strength and direction of the influence of particular factors on the capital structure in Poland's food manufacturing industry are investigated. The study is conducted using linear panel models. The results obtained are compared with other authors' research outcomes.

2   Contemporary Theories and Internal Factors of Capital Structure

Financing of enterprises has been a research subject for many years. The first model of capital structure was developed by MODIGLIANI and MILLER (MM) (1958). This model, referring to the conditions of a perfect market without tax burdens, proved that the cost of capital does not depend on its structure. After supplementing the simple MM model with an income tax, it turned out that the optimal capital structure occurs when the enterprise is financed entirely with external capital (MODIGLIANI and MILLER, 1963).

As a result of the criticism of the MM model, more theories were formulated. JENSEN and MECKLING (1976) started to work on a concept based on agency theory. The conflict of interest between the creditors, shareholders and the management of the enterprise regarding the use of free cash flow was a premise underlying this theory. The agency theory claims that debt, and the necessity of debt service, mitigates this conflict.

Another theory, based on the assertion that through the selection of the capital structure, the management board signals the knowledge about the condition of the company to the environment was proposed by ROSS (1977). In view of this concept, called the

signalling theory, higher indebtedness implies the ability to generate high free cash flows in the future.

MYERS and MAJLUF published another theory (the pecking order theory) in 1984. In view of this theory, internal financing is the fundamental source of capital for investments of an enterprise. Debt is a supplementary source. The last source is the issue of shares (MYERS and MAJLUF, 1984).

The static trade-off theory is the last of the classical capital structure theories. It assumes that the optimal debt ratio results from the comparison of benefits deriving from interest tax shield to the costs of financial difficulties arising from the enterprise's indebtedness (MYERS, 1984).

The analysis of the discussed capital structure theories was conducted by HARRIS and RAVIV (1991) and FRANK and GOYAL (2007). As a result of these analyses, the authors identified some internal factors that may influence corporate decisions related to the structure of sources of finance:

(1) share of fixed assets in the company's assets in total (TANG);
(2) size of the enterprise (SIZE);
(3) growth opportunity (GROW);
(4) profitability (PROF);
(5) liquidity (LIQ); and
(6) value of the non-debt tax shield (NDTS).

The share of total debt (DR) and the share of long-term debt (LDR) in financing of total assets were used as measures of the capital structure.

The influence of these factors on capital structure was explained, among others by: NEJAD and WASIUZ-ZAMAN (2013), ISLAM (2016) and CZERWONKA and JAWORSKI (2019). The direction of the relationships between aforementioned factors and the indebtedness of enterprises in view of particular theories is presented in Table 1.

Fixed assets are good collaterals for liabilities and they are less exposed to value losses than current assets. Consequently, high share of fixed assets in total assets reduces financial risk and may increase the share of debt in the enterprise's capital structure. Better debt collaterals also reduce the cost of its issuance. It means that in view of the static trade-off theory and the agency theory, the relationship between the share of fixed assets in total assets and debt is positive. A negative relationship can be found in the pecking order theory. A higher share of fixed assets decreases the information asymmetry. In turn, it causes a decrease in the cost of equity and a reduction in the enterprises' indebtedness.

The size of the enterprise is the factor shaping the capital structure according to the static trade-off theory and agency theory. Due to the typically diversified activities and resources, the risk of bankruptcy is smaller for large enterprises than for small enterprises. Large enterprises also have a better reputation based on the time and scope of their operations. It causes a lower cost of debt issuance for large companies. Therefore, the share of debt in the capital structure may increase with a rising size of the enterprise (positive dependence).

The larger the enterprise, the lower the cost of equity. This relation may suggest a reduction in the share of debt in sources of the enterprise's financing. At the same time, larger enterprises have more assets. It means that the demand for financing is also higher and the use of debt in financing should also increase. Thus, the causality between the size of the enterprise and the degree of indebtedness is not clearly defined from the point of view of the pecking order theory.

The growth of the enterprise causes an increase in the demand for financing. In view of the pecking order theory, debt is the preferred source of finance.

Table 1. Impact of selected factors on the share of debt in corporate financing in view of capital structure theories

Factor/Share of debt	Agency theory	Signalling theory	Pecking order theory	Static trade-off theory
TANG	+	n/a	-	+
SIZE	+	n/a	-/+	+
GROW	-	+	+	-
PROF	+	+	-	+
LIQ	n/a	n/a	-	+
NDTS	+	n/a	-	-

+ positive dependence
- negative dependence
-/+ unspecified dependence
n/a no grounds to identify the dependence

Source: own work based on CZERWONKA and JAWORSKI (2019)

The positive relationship between growth of the enterprise and its indebtedness is also pointed out by signalling theory. This theory claims that a faster growth of the company, being a positive signal for investors, raises stock prices. It means that debt will be a cheaper source of financing than equity. The static trade-off theory and the agency theory point out the opposite relationship. For fast growing enterprises, bankruptcy costs are higher - these companies lose relatively more in value. Fast growth is usually based on more risky projects. In both cases, the cost of debt is higher, so debt will be used less often than equity for financing purposes.

An increase in the profitability of the enterprise favours its self-financing, and thus limits the share of debt in its capital structure. Consequently, there is a negative relationship between the profitability and indebtedness of the enterprise in view of the pecking order theory. In the case of other theories, this relationship is negative. The static trade-off theory claims that profitable enterprises have lower costs related to the risk of bankruptcy and more benefits derived from using the tax shield. On the other hand, signalling theory says that a profitable company sends positive signals to creditors, which enables a further increase in debt. The agency theory also recognizes a higher indebtedness as more favourable for profitable enterprises. It constitutes a natural mitigation of the conflict regarding the use of high free cash flows.

In the light of the pecking order theory, enterprises with a high financial liquidity are more willing to use internal sources of financing rather than debt (negative dependence). In turn, from the point of view of the static trade-off theory, a higher share of liquid assets in the assets means a lower risk of bankruptcy. It makes increasing indebtedness more profitable due to the use of the tax shield (positive relationship).

The non-debt tax shield is a determinant of the capital structure which can be derived from the static trade-off theory. The increase in the depreciation level is a substitute for the interest tax shield and reduces the enterprise's willingness to increase the debt. The negative relationship between the non-debt tax shield and debt can also be inferred from the pecking order theory. A higher depreciation level means that the free cash flow is greater. It equals increased self-financing opportunities. The agency theory indicates a positive relationship between the non-debt tax shield and debt. Increased depreciation is the cause of greater free cash flow at managers' disposal. Increasing debt is a way of limiting irrational use of the free cash flow.

3 Industry as an External Determinant of Capital Structure

Business practice shows that organizations that operate in different industries have their own specifics which can cause the aforementioned internal factors to affect the capital structure in other ways (direction and strength). The industry as one of the external determinants was pointed out by TITMAN and WESSELS (1988). This dependence was also analysed by BRADLEY et al. (1984) and HARRIS and RAVIV (1991).

The influence of a particular industry on the capital structure is expressed by the common characteristics of the operations performed, the scale of the activity, the opportunities for growth, the impact of the same regulations, similar financing strategies, similar opportunities and threats in a given market (EBEH EZEOHA, 2011). In addition, the literature on the issue indicates that this influence is caused by the sensitivity of a given industry to economic conditions, which contributes to avoiding excessive debt (KIM and BARRETT, 2002).

Industries with a higher operational risk have limited access to external funding. Therefore, the specificity of the industry indirectly influences the formation of the capital structure in the company. The specificity of the industry in this area is also determined by the structure of assets that affects the ability to optimize the financial risk associated with the use of debt in the financing structure (ROSS et al., 2013). This is confirmed by studies on the pecking order theory, which show that companies requiring a high capital expenditure are characterized by a higher debt level (MYERS, 2001; MYERS and MAJLUF, 1984; FRANK and GOYAL, 2003).

The influence of belonging to a given sector on the structure of the capital of enterprises has been confirmed in numerous empirical studies. JOEVEER (2006, 2013) showed that among the external factors, industry-specific determinants best explain the changeability of the capital structure (ca. 53%). The study of KAYO and KIMURA (2011) proved that industry dynamics exert a significant impact on the enterprises' indebtedness. The faster growing an industry, the smaller the indebtedness of enterprises. This confirmed previous observations of SIMERLY and LI (2000). According to SMITH et al. (2015) a munificence of the industry understood as a capacity to support a sustained growth is a significant factor of the capital structure. Industries with high munificence have abundant resources, low levels of competition,

high profitability and, as a consequence, lower indebtedness. MACKAY and PHILLIPS (2005) recognized that high-concentrated industries have higher levels of leverage and lower intra-industry dispersion in contrast to low-concentrated industries in which leverage is lower.

Currently, detailed studies on the direction and strength of the internal capital structure determinants in particular industries are being developed. Their purpose is to determine the characteristics of industries. The studies conducted by: AFZA and HUSSAIN (2011), JĘDRZEJCZAK-GAS (2014), CZERWONKA and JAWORSKI (2017), GOMEZ et al. (2016), SUNARTO and RELY (2017) are examples of such research. The first authors examined the Pakistani automobile, cable and electrical goods and engineering industries. JĘDRZEJCZAK-GAS (2014) identified internal capital structure factors for the Polish construction industry. CZERWONKA and JAWORSKI (2017) examined Polish industrial companies listed on the Warsaw Stock Exchange. The study of GOMEZ et al. (2016) was based on the Latin American mining industry. SUNARTO and RELY (2017) studied the Indonesian manufacturing industry.

4 Determinants of Capital Structure in the Food Manufacturing Industry: A Literature Review

The determinants of the capital structure in the food manufacturing industry have also been subject to empirical studies. Among them there is the research conducted by FORSTER (1996) on a sample of 112 agribusiness companies on the US market in 1984-1993. SPORLEDER and MOSS (2001) continued his studies based on data from 1994 to 1998. They investigated the determinants of the capital structure of food manufacturing companies listed at US stock exchanges. ROSSI et al. (2015) surveyed 82 Italian agro-food producers in the years 2007-2011, representing the sector of small and medium enterprises. KARA and ERDUR (2015) analysed the issue of the capital structure of Turkish public companies in 2006-2014. AULOVÁ and HLAVSA (2013) analysed determinants of the capital structure for agricultural businesses of legal entities in the Czech Republic within the period of 2004-2010. The detailed results of the above-mentioned studies with the comparison of the particular determinants are presented in Table 6.

The structure of assets and the profitability of the enterprise proved to be important factors in the capital structure that was measured by the share of the total debt. In the first case, the negative relationship between debt and the share of fixed assets in total assets was most often diagnosed. Only American companies turned out to be an exception to the rule in this case. A similar situation has been observed for profitability. In this case, Czech companies were an exception. In the Czech Republic the statistically significant dependence of indebtedness on profitability varied in the analysed period.

For the US economy, the remaining identified determinants of total corporate debt were: size of the enterprise (positive relationship) and financial liquidity. The latter variable affected the level of debt of companies in the USA negatively, as well as in the Czech Republic.

For the Italian, Turkish and Czech economies, several factors have been identified as significantly important for the long-term indebtedness of food manufacturing companies. It was the share of fixed assets in total assets, which led to a decrease in long-term debt in Turkey, while in Italy, on the contrary, it led to growth. In the Czech Republic, the direction of this relationship depended on the period studied. The same characteristic of the Czech economy was observed for the profitability and liquidity of the food manufacturing industry. In Turkey, there is also a negative relationship between the firm's size and the long-term debt. In Italy, the same dependence was noticed between the long-term debt and the company's profitability.

A small number of the identified determinants affecting the indebtedness of American and Turkish enterprises does not allow us to propose a theory explaining the decisions made by these enterprises in the area of shaping their capital structures. Taking into account the directions of the influence of internal factors on the capital structure presented in Table 1 we can point out that in the Czech food manufacturing industry this theory is the pecking order theory and for Italy it is the static trade-off theory.

The nature of the food manufacturing industry was also studied in Poland. The specificity of this particular industry is conspicuous in its the long-term operational cycles and activities that depend on weather conditions, livestock management, specific work factors and production risk factors. The food manufacturing industry in the long-term assessment displays the lowest financial risk compared to other

Table 2.   Measures for dependent and independent variables used in the study

	Variables	As proxies for	Measures
Dependent	DR	Capital structure (basic measure)	$\dfrac{total\ debt}{total\ assets}$
Dependent	LDR	Capital structure (auxiliary measure)	$\dfrac{long\text{-}term\ debt}{total\ assets}$
Independent	TANG	Share of fixed assets in the total assets	$\dfrac{fixed\ assets}{total\ assets}$
Independent	SIZE	Company size	$\ln(total\ assets)$
Independent	GROW	Company growth	$\dfrac{\Delta total\ assets}{total\ assets} \times 100\%$
Independent	PROF	Profitability	$\dfrac{EBIT}{total\ assets}$
Independent	LIQ	Liquidity	$\dfrac{current\ assets}{current\ liabilities}$
Independent	NDTS	Non-debt tax shield	$\dfrac{depreciation}{total\ assets}$

Source: own work

industries of the Polish economy (SZCZEPANIAK, 2015). In this sector equity plays the main role as a source of finance. This is followed by short-term and long-term liabilities (MĄDRA-SAWICKA, 2016).

The research in the capital structure field is divided into different units of the food industry such as farms, agriculture holdings, agriculture cooperatives, small and medium companies, selected groups of food companies and listed companies. The research conducted does not provide or specify determinants of the capital structure of the food manufacturing industry itself.

The capital structure in agricultural units does not differ significantly from non-agricultural companies in the food manufacturing industry. Certain specifics of the activity in agriculture result mainly from the long-lasting turnover of capital in the food manufacturing industry and a greater risk coming from the activity in the circumstances of the nature. Taking into account this characteristic, the primary problem in building the capital structure is not the rating of capital costs and an optimal option of the structure, but it is finding necessary financial sources (HACHEROVA et al., 2003). In this regard, the factors determining the debt level of Polish agricultural holdings include the return on assets and equity and the liability turnover ratio (WASILEWSKI and MĄDRA, 2009). Similar conclusions apply to other Central European markets – the Czech Republic and Lithuania (STEKLA and GRYCOVA, 2016; NORVAISIENE and STANKEVICIENE, 2012). According to JAKUBCZAK (2009), the high level of debt in Polish agriculture enterprises reduces profitability and liquidity. The research of BEREZNICKA and PAWLONKA (2014) proved that the low debt level of companies from the food manufacturing industry is emphasised by the positive relation between debt level and profitability of assets.

5 Methodology

5.1 Variables and Models

On the basis of the experience of the other mentioned scholars, we decided to use in the research the variables described and explained in Table 2. The first two indicators are proxies for capital structure. The next measures present proxies for determinants of capital structure.

Econometric panel models were used for the identification and measurement of the significance and impact of the independent variables on the dependent variable:

(1)   regression model
(Ordinary Least Squares Method):

$$DR_{it}\ (or\ LDR_{it}) = \beta_0 + \beta_1 TANG_{it} + \beta_2 SIZE_{it} + \beta_3 GROW_{it} + \beta_4 PROF_{it} + \beta_5 LIQ_{it} + \beta_6 NDTS_{it} + \varepsilon_{it}, \qquad (1)$$

Table 3.   Descriptive statistics of the research sample

Variable	Mean	Median	Std. Dev.	Min.	Max.
DR	0.508	0.517	0.223	0.000	0.998
LDR	0.127	0.082	0.142	0.000	0.961
TANG	0.470	0.470	0.212	0.000	1.000
SIZE	3.562	3.406	1.323	-0.301	8.084
GROW	0.087	0.031	0.387	-0.751	9.848
PROF	0.091	0.062	0.124	-0.817	1.295
LIQ	2.072	1.330	2.990	0.080	75.787
NDTS	0.047	0.042	0.029	0.000	0.208

Source: own work

(2)   model with fixed effects:

$$DR_{it} \text{ (or } LDR_{it}) = \beta_0 + \beta_1 TANG_{it} + \beta_2 SIZE_{it} + \beta_3 GROW_{it} + \beta_4 PROF_{it} + \beta_5 LIQ_{it} + \beta_6 NDTS_{it} + \mu_{it},$$ (2)

(3)   model with random effects:

$$DR_{it} \text{ (or } LDR_{it}) = \beta_0 + \beta_1 TANG_{it} + \beta_2 SIZE_{it} + \beta_3 GROW_{it} + \beta_4 PROF_{it} + \beta_5 LIQ_{it} + \beta_6 NDTS_{it} + \varepsilon_{it} + \mu_{it}.$$ (3)

The simplest method of analysing panel data is to treat it as cross-sectional data and to apply the ordinary least squares method (OLS) to the estimation (1). However, the use of such an estimator often leads to inaccurate estimates, due to heterogeneity of the population. If individuals are assumed to be different, then it is appropriate to apply a model with fixed effects (2) that takes into account the occurrence of unknown differences among individuals which do not vary over time. In the case where the individual effects are not uniform in successive periods, the model with random effects (3) should be used (GREENE, 2003).

To determine whether a model can be estimated with OLS, it is necessary to verify the hypothesis that there is an individual effect. For this purpose, the Breusch-Pagan test was used. Failure to reject the null hypothesis saying that the variance of the individual effect component is zero, means that individual effects are absent and the OLS model can be applied. Its rejection means that it is desirable to introduce individual effects, so the OLS estimation cannot be applied. The Hausman test is helpful in selecting individual effects, fixed or random. The null hypothesis of this test assumes no correlation between independent variables and random effects; in view of an alternative hypothesis, such a correlation occurs. Failure to reject the null hypothesis indicates that the random effects estimator is more efficient. The rejection of the null hypothesis suggests the choice of a model with fixed effects (GREENE, 2003).

GRETL software was used for all calculations.

5.2 Data and Descriptive Statistics

The data from the financial statements of 1,038 Polish food manufacturing industry entities, drawn up in 2012-2015, were the basis of the study. These data were taken from the EMIS Intelligence database[1]. Food manufacturing companies were selected on the basis of NACE Rev. 2 classification (divisions 10 and 11, manufacture of food products and beverages).[2] A total of 2,161 observations were included in the study of the DR model and 2,961 observations were included in the final LDR model. The research sample selection criterion was the completeness of the data available for the selected study period.

The descriptive statistics of the research sample was verified for the data validity assessment and isolation of outliers (Table 3). Questionable cases were explained or eliminated from the study.

The mean and the median of the debt ratio (DR) is about 51%. The mean of long-term debt ratio (LDR) is 13%, and the median is 8%. The values of these variables are in the range from zero to one, the same as for the variable TANG. For TANG both the mean and the median are 47%. SIZE is a natural logarithm of the total assets that determines the size of the enterprise and ranges from -0.301 to 8.08 (due to the properties of the logarithmic function for

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[1]   EMIS Intelligence database contains data obtained from providers in local markets. The range of data encompasses emerging markets. The database screening tool allows users to find a range of companies that match detailed profile criteria. More: www.emis.com.

[2]   NACE is the statistical classification of economic activities in the European Union. NACE Rev. 2, a revised classification, was adopted at the end of 2006 and in 2007. More: http://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Statistical_classification_of_economic_activities_in_the_European_Community_(NACE).

assets below PLN 1 million the variable has negative values). The mean is 3.56 and is not much different from the median (3.41). GROW and PROF denoting the asset growth rates and profitability may be negative. Because of the outliers, the better average measure for the GROW, PROF and LIQ variables is the median. By using the median to determine the average value, it can be seen that half of the companies in the sample increased their assets at a higher rate than 3.1% in the studied period 2012-2015 while the rest increased their assets more slowly or reduced them. Similarly, half of the studied companies achieved a profitability of up to 6.2%, while the next half of the business entities are even more profitable. The median liquidity ratio is 1.33, and the NDTS is 0.042.

6 Study Results

Table 4 presents the Pearson's correlation coefficients calculated for all independent variables. They have been calculated for excluding mutually correlated variables from the further estimation.

In most cases, a correlation between the independent variables occurs (for significance level $p = 0.05$ 12 out of 15 correlation coefficients exceed the critical value), but its strength is not high, reaching a maximum value of 0.48. It means that multicollinearity should not be an issue for consideration in the estimation of the models.

Table 5 shows the estimated parameters of the models used in the study and the values of the tests that verify their adequacy.

Table 4. Linear correlation coefficients of the variables tested (critical value = 0.0304 for p = 0.05)

TANG	SIZE	GROW	PROF	LIQ	NDTS	
1.000	0.143	0.011	-0.058	-0.218	0.476	**TANG**
	1.000	0.059	-0.138	0.007	-0.136	**SIZE**
		1.000	0.082	-0.020	-0.172	**GROW**
			1.000	0.137	0.070	**PROF**
				1.000	-0.071	**LIQ**
					1.000	**NDTS**

Source: own work

Table 5. Results of model estimation (1)

Variable/ model	OLS		Random effects		Fixed effects		
	1	2	3	4	**5**	6	**7**
Dependent	DR	LDR	DR	LDR	**DR**	LDR	**LDR**
Constant	0.753*** (0.016)	0.019* (0.011)	0.653*** (0.021)	-0.007 (0.015)	**0.384*** (0.041)**	-0.222*** (0.039)	**-0.223*** (0.025)**
TANG	-0.139*** (0.023)	0.262*** (0.016)	-0.089*** (0.023)	0.301*** (0.018)	**-0.090*** (0.029)**	0.316*** (0.027)	**0.287*** (0.021)**
SIZE	-0.016*** (0.003)	0.0004 (0.002)	-0.002*** (0.005)	0.004 (0.003)	**0.069*** (0.011)**	0.062*** (0.010)	**0.063*** (0.007)**
GROW	0.064*** (0.011)	0.042*** (0.007)	0.027*** (0.005)	0.019*** (0.005)	**0.014*** (0.005)**	0.006 (0.005)	
PROF	-0.375*** (0.032)	-0.151*** (0.022)	-0.341*** (0.023)	-0.160*** (0.020)	**-0.331*** (0.024)**	-0.170*** (0.023)	**-0.065*** (0.019)**
LIQ	-0.040*** (0.002)	-0.001 (0.001)	-0.020*** (0.001)	0.004*** (0.001)	**-0.013*** (0.001)**	0.008*** (0.001)	**0.007*** (0.001)**
NDTS	-0.306* (0.164)	-0.080 (0.113)	-0.505*** (0.143)	-0.330*** (0.117)	**-0.418** (0.163)**	-0.386** (0.153)	**-0.226** (0.116)**
No. of obs.	2161	2152	2161	2152	**2161**	2152	**2961**
Adj. R squared	0.312	0,188					
Breusch-Pagan test	LM = 1377.29 p < 0.0001	LM = 1128.12 p < 0.0001					
Hausman test	H = 177.28 p < 0.0001	H = 72.61 p < 0.0001					

* dependence is significant at the level of 0.1; ** dependence is significant at the level of 0.05; *** dependence is significant at the level of 0.01 (standard errors in parentheses)

Source: own work

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The result of the Breusch-Pagan test for both dependent variables indicates that the null hypothesis should be rejected (the value of the statistics does not exceed the significance level 0.05), so it is impossible to apply the OLS estimation for the research sample. Similarly, the Hausman test indicates the necessity of rejecting the null hypothesis (in both cases the statistics value is below the significance level of 0.05), which means that the fixed effects model best explains both dependent variables and therefore it should be selected.

6.1 Total Debt Ratio

The model parameters for the dependent variable DR show that all independent variables are statistically significant (model 5).

On the basis of the final versions of the analysed models, for the dependent variable DR TANG, SIZE, GROW, PROF, LIQ and NDTS are significant variables. SIZE and GROW have a positive effect on the corporate debt (DR) whereas TANG, PROF, LIQ and NDTS exert a negative influence on the corporate debt. This means that the higher the share of fixed assets in the total assets, profitability, liquidity and the greater the non-debt tax shield, the lower the total debt ratio of enterprises. The size and growth of the enterprise are the determinants for the increase in debt.

6.2 Long-Term Debt Ratio

The model parameters for the dependent variable LDR show that GROW is statistically insignificant (model 6). This variable was removed from the model and as a result model 7 was obtained (after its removal, the number of usable years increased by 1 because the variable GROW is an index).

The variables TANG, SIZE, PROF, LIQ and NDTS turned out to be significant for explaining the LDR. PROF and NDTS exert a negative impact on the company's long-term corporate debt (LDR), while TANG, SIZE, and LIQ exert a positive impact. This means that the higher the share of fixed assets in the total assets, the size of the business and liquidity, the higher the long-term debt ratio. The profitability and non-debt tax shield are determinants that reduce debt.

7 Discussion and Conclusions

Table 6 presents the determinants of the capital structure for the Polish food manufacturing industry against the background of studies conducted in other countries.

The study proves that all six assumed internal factors exert influence on the capital structure of the food manufacturing enterprises in Poland (an answer

Table 6. Determinants of the capital structure of the Polish food manufacturing industry against other countries

Factor/ Share of debt		TANG	SIZE	GROW	PROF	LIQ	NDTS
USA	**DR**	+	+	n/a	-	n/a	n/a
	Theory	No grounds to identify the capital structure theory					
Italy	**DR**	+	+	n/a	-	n/a	-
	LDR	+	+	n/a	-	n/a	-
	Theory	The static trade-off theory					
Turkey	**DR**	-	n/a	n/a	-	n/a	n/a
	LDR	-	-	n/a	n/a	n/a	n/a
	Theory	No grounds to identify the capital structure theory					
Czech Republic	**DR**	-	n/a	n/a	+/-	-	+
	LDR	+/-	+	n/a	+	-	+
	Theory	The pecking order theory					
Poland	**DR**	-	+	+	-	-	-
	Theory	The pecking order theory					
	LDR	+	+	n/a	-	+	-
	Theory	The static trade-off theory					

+ positive dependence
- negative dependence
-/+ unspecified dependence
n/a no grounds to identify the dependence

Source: own work based on SPORLEDER and MOSS (2001), ROSSI et al. (2015), KARA and ERDUR (2015), AULOVÁ and HLAVSA (2013) and CZERWONKA and JAWORSKI (2017)

to research question Q1). The share of fixed assets in total assets, profitability, liquidity and non-debt tax shield exert a significantly negative influence on the total indebtedness of enterprises. The relationships between this indebtedness and the size and growth of enterprises are positive (an answer to research question Q2). These dependencies suggest that the capital structure (measured by the total debt ratio) of the Polish food companies is best explained by the pecking order theory (an answer to research question Q3).

The fact that the capital structure, measured by the long-term debt ratio is best explained by another theory, i.e. the static trade-off theory, is also an important observation. In accordance with this theory, the increase in the share of fixed assets in the total assets, the size of the company and the liquidity of the enterprise cause an increase in debt. This coincides with the study results. In turn, the profitability of the enterprise in accordance with the same theory should also exert a positive influence on the debt level. However, the outcomes of the presented study are opposite and closer to the pecking order theory.

Answering research question Q4, it can be stated that the scope and direction of the influence of particular factors in the Polish food manufacturing industry are most similar to those identified in the Czech Republic (Central Europe). In both countries the indebtedness of enterprises is best explained by the pecking order theory. The significant difference concerns only one of the internal factors. The non-debt tax shield, in contrast to Poland, exerts a positive influence on total level of indebtedness of the food manufacturing enterprises in the Czech Republic. The list of determinants of long-term indebtedness includes two differences (opposite directions of relationships for the non-debt tax shield and profitability). Fewer similarities can also be observed in the Italian economy (EU). In the case of the USA and Turkey, there are significant differences which cannot be overlooked.

Differences in the impact of internal factors on the capital structure of food manufacturing enterprises across countries indicate that there are external factors other than at the industry level (e.g. country-specific factors). This in turn is the reason why simple cross-industry comparisons for different countries should be avoided. Taking into account Polish companies only, the differences are significant. In the construction industry the company's growth exerts a negative influence on indebtedness of enterprises; profitability exerts a positive influence, while the size and non-

debt tax shield does not affect the capital structure (JĘDRZEJCZAK-GAS, 2014). In the case of the industrial enterprises the influence of the size and non-debt tax shield is opposite to the one conspicuous in the food manufacturing industry (CZERWONKA and JAWORSKI, 2017).

The main limitations of the study include: (1) the assumed linear dependence in the models, (2) the lack of randomness in research objects and (3) the limited time range.

On the basis of the presented results of exploratory and comparative studies, it can be argued that the regional circumstances (Central Europe, EU) are the factors influencing the capital structure in the companies of the food manufacturing industry. There are also certain premises for attempting to identify the cause-and-effect relationships of the diagnosed dependencies, and consequently, for creating the model of financial decision making related to the sources of finance based on the contemporary capital structure theories. This will be the subject of the authors' further research.

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