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Influence of the selected factors on the capital structure of enterprises in the construction industry

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1. Introduction

These are the issues related to shaping the capital structure of enterprises that are fundamental problems of corporate finances. According to the persons dealing with corporate finances, the main objective, which is the maximization of financial benefits of the co-owners, is achieved among others through the optimization of the capital structure (Szyszko 2000, pp. 140-141). From the point of view of the optimization of the capital structure, it is the most important to determine the types and the amount of the capital, which is necessary to finance the assets of the enterprise and to choose the sources of raising the capital.

Capital structure has been of interest to the researchers in the field of finance theory for over 60 years. A particular growth of interest in this issue followed the publication of the article M. Modigliani and M.H. Miller, „The Cost of Capital, Corporation Finance and the Theory of Investment" (Modigliani, Miller 1958) and „Corporate Income Taxes and the cost of capital: a correction" (Modigliani, Miller 1963). The first article presented in the MM theory, which showed that in a world without taxes the value of both companies, as well as

its cost of capital do not depend on capital structure. In the second article the authors discussed the problem of the role of taxes in shaping the financial policy of enterprises. The authors presented the revised impact of capital structure on the value of company with the ascent of the income tax, arguing that under these conditions there is an optimal capital structure. Since the publication of the work of Modigliani and Miller, a number of research has been created describing and explaining the theory of capital structure (Harris, Raviv 1991). However, the studies of the literature indicate that there was relatively little research on the capital structure and the factors shaping it in Poland.

The purpose of this article is to identify and to examine the strength and the direction of the influence of the selected microeconomic factors on the capital structure of the enterprises belonging to the construction industry and quoted on the NewConnect share market. It is in order to accomplish this objective that the correlation analysis and the linear regression methods were applied.

2. The concept of the capital structure

In the literature the term of the structure of capital is not uniformly definable[1]. According to some authors, the capital structure is equated with the structure of the enterprise liabilities, which is also called the structure of financing. They define the capital structure as a share of the equity capital and the external capital in financing activities of the company (Masulis 1988; Higgins 1992; Ross, Westerfield, Jaffe 1996; Jerzemowska 2004).

According to other authors, capital structure is mixed with the structure of fixed capital, which finances fixed assets and part of current assets. Capital structure is thus defined as the ratio of long-term debt to equity (Weston, Copeland 1992, p. 493; Moyer, McGuigan, Kretlow 1992, p. 518).

There is also a view in the subject literature that the capital structure includes all capitals used in the enterprise, which involve financial costs (Modigliani, Miller 1963; Gajdka 2002; Skowronek-Mielczarek 2005).

For the needs of this study, it was the share of the equity capital and external capital in financing the assets of the enterprise that was taken as the capital structure.

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1   Different approaches to defining the capital structure have been presented including in: A. Duliniec (2001, pp. 13-17).

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3. The classification of the determinants of the capital structure

In the literature of the subject, there are many criteria for the classification of the determinants of the capital structure. These determinants are most often divided into macroeconomic and microeconomic ones according to their relation to the enterprise environment (Iwin-Garzyńska, Adamczyk 2009; Błach 2009). The macroeconomic factors are associated with further environment of the enterprise (with macroenvironment); these are among others: the specificity of the industry, inflation, tax system, government policy. Whereas, the microeconomic factors are associated with the closer environment of the enterprise (with the competitive environment); these are the position of the company on the market and the quality of the management among others. These factors result from mutual relations among entities and are shaped in the very enterprise. The macro- and microeconomic factors are very widely and in detail presented in the literature on the subject (Jerzemowska 1999, pp. 51-60).

The next criterion for the classification of the determinants of the capital structure very often mentioned in the literature is the possibility of reacting by the enterprise to the given determinants. According to this criterion, there are distinguished external determinants (exogenous) and internal determinants (endogenous). The external determinants are the variables, which cannot be affected by a single company. These are the so-called macroenvironment factors (legal, political, international, technological and economic factors). The internal determinants can be shaped by the given enterprise to a large extent. They include among others: suppliers of the capital, the organizational and legal form, the cost of the equity capital (Ickiewicz 2001, p. 16; Kłosowska, Tokarski, Tokarski, Chojnacka, pp. 25-30).

Other criteria presented in the literature on the subject of the classification of the determinants are among others:
- the specification of the determinants: (1) legal determinants, (2) economic determinants (Ickiewicz 2004, pp. 205-207),
- the influence on the level of the leverage (debts): (1) the factors encouraging increasing the debt (2) the factors discouraging from increasing the debt (Duliniec 2011),
- the approach towards distinguishing the determinants: (1) subjective determinants (2) objective determinants (Szczepaniak 2009).

Moreover, it should be noticed that authors are mentioning different determinants of the capital structure in many studies, but they do not

show any criteria for their classification. For example, E. F. Brigham (2005, pp. 173-175) lists among the factors affecting the capital structure: the stability of sales, assets structure, operating leverage, firm growth rate, profitability, taxation, management control over the business, management preferences, requirements of rating agencies and lenders, market conditions, internal determinants of company and financial flexibility.

4. The identification of the determinants of the capital structure

The determinants of the capital structure are the subject of the empirical research above all in Western Europe and the United States. However, there were conducted only few studies on the capital structure and the factors shaping it in Poland.

The empirical research on the determinants of the capital structure conducted in Poland is dominated by two approaches. The first one, which is the most common one, consists in the analysis of the relations among the selected factors (explanatory variables - indicators calculated on the basis of the data from financial statements) and the debt level (the variable being explained) with the use of the statistical methods (the correlation analysis, the linear regression analysis). The research based on this method was carried out among others by A. Skowroński, Z. Wilimowska, M. Wilimowski (Skowroński 2002, pp. 59–73; Wilimowska, Wilimowski 2010, pp. 627–641).

According to the authors, the selection of the factors (of the potential determinants) being subject to the analysis is a result of the theories on the capital structure existing in the literature. However, it should be noted that some of the factors are correlated with the debt level positively in some theories and negatively in other ones. For example, there are two opposing theories on the impact of asset structure on the debt level: the bankruptcy cost theory and the signalization theory. According to the bankruptcy cost theory, the increase of the share of the fixed assets in the structure of the assets results in the increase in the debt level. Whereas, according to the theory of signalization, it is with the increase of the share of the fixed assets in the structure of assets that the debt level falls (Wilimowska 2010).

The studies having been conducted in Poland so far show, among others, that between the debt level and:
- the asset structure, sales profitability, assets profitability and financial liquidity, there is a negative correlation (Wilimowska, Wilimowski 2010; Mazur 2007; Hamrol, Sieczko 2006; Czaja 2005),

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- the size of the company – there is positive correlation (Wilimowska, Wilimowski 2010; Czaja 2005),
- non-interest tax shield – according to some of the studies, there is a negative correlation (Zygmunt 2009), to other ones – a positive correlation (Czaja 2005).

The second approach consists in the indication of a certain relation of the equity capital to the debt capital and the factors affecting the choice of the sources of financing on the basis of a questionnaire survey. The questionnaire method was applied among others by A.E. Miarecka and I. Borkowska (Miarecka 2004, pp. 65–77; Borkowska 2007, pp. 207–213)

While summing up, it should be stated that there are presented different criteria for the classification and different opinions on the methods of examining determinants of the capital structure in the literature on the subject. The findings of the examinations and analyses conducted so far do not allow for formulating explicit conclusions and for answering the question, which determinants influence the capital structure to the greatest extent.

5. The characteristics of the capital structure in the examined enterprises

The enterprises being the object of the analysis are companies quoted on the NewConnect share market. This market was created by Warsaw Stock Exchange for small and medium-sized enterprises (SMES). The NewConnect is a modern market financing the development of SMEs being on various stages of the development and operating in different industries. At the very moment, there are 32 companies belonging to the construction industry quoted on this market. Out of this group, there were 15 companies selected for the needs of this study, because they met the selection criterion, which was the publication of the financial data for the period 2009-2012.

The following indicators were chosen to characterize the capital structure of the examined companies:

- the rate of participation of equity in total liabilities = equity /total liabilities,
- total debt ratio = total liabilities / total assets,
- indicator of the capital structure = equity / foreign capital.

The data on the capital structure of the examined enterprises were presented in the table 1.

Table 1. The indicators of the capital structure of examined enterprises

Year	(Share equity / Equities and liabilities) x 100%	(Foreign capital / Total assets) x 100%	Share equity / Foreign capital
2009	47,53%	52,47%	0,91
2010	50,81%	49,19%	1,03
2011	41,40%	58,60%	0,71
2012	43,07%	56,93%	0,76
Average of the analyzed 4 years	45,70%	54,30%	0,85

Source: own study based on the annual reports of the companies analysed

It results from the data presented in the table 1 that debt capitals plaid an important role in financing the examined enterprises in the period of the analysed. The calculated average value of the debt capital in the total assets in the 4 analysed years was about 54,3%. Moreover, it should be noticed that the importance of the debt capital in financing the examined enterprises increased the years of the research. In the years 2009 and 2010, the debt ratio was about 50-52% and rose up to 57-58% in the 2011 and 2012 respectively.

On the other hand, the capital structure ratio shows that the value of the equity capital per 1 Zloty of the debt capital decreased in the examined enterprises in the years since 2009 to 2012. In the years 2009 and 2010, this ratio was about 0,9-1,0 and decreased to the level of about 0,7 in the consecutive years.

The calculated indicators (the rate of participation of equity in total liabilities, total debt ratio, indicator of the capital structure) show that there was a change of the capital structure in the examined enterprises in the period of the analysed. In the years 2009 and 2010, the share of the equity capital in the structure of the sources of financing increased (from 47,5% to 50,8%) and the share of the debt capitals decreased (from 52,5% to 49,2%). In the consecutive years, i.e. 2011-2012, the share of the debt capital in the structure of the sources of financing increased (from 49,2% in 2010 to 57% in 2012) and the share of the equity capital decreased (from 50,8% to 43,1%).

As a result, the question arises: "Were the changes in the share proportion of the equity and debt capital in financing enterprises of the construction industry observed over the period 2009 -2012 associated with shaping the optimum capital structure?

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The attempt to find answers to this question is to calculate the leverage ratio, which is the difference between the level of profitability of equity and the level of profitability of assets (table 2).

Table 2. The leverage ratio of the examined enterprises

Year	ROE	ROA	Financial leverage
2009	12,61	6,00	6,62
2010	20,71	10,52	10,19
2011	14,22	5,89	8,33
2012	3,03	1,31	1,73
Average of the analyzed 4 years	12,64	5,93	6,72

Source: own study based on the annual reports of the companies analysed

The leverage ratio allows for an assessment of effectiveness of the use of the debt capital. In 2010 (compared to 2009), the share of the debt capital in financing the assets decreased, whereas the leverage ratio increased. In 2011 the share of the debt capital in the financing source structure increased, whereas the leverage ratio decreased. In 2012, the share of the debt capital in liabilities decreased to a little extent and the leverage ratio decreased to a considerable degree.
The data above suggest that it is very difficult to find any relationship between the changes in the share of the equity and debt capital and actions being aimed at optimization of the capital structure.

6. The determinants of the capital structure of the examined enterprises

According to the authors of the empirical studies carried out, the potential determinants of the capital structure are derived from the existing theories on capital structure. The factors most frequently investigated by them (the exogenous variable) are: structure of assets, return on sale, return on assets, financial liquidity, cost of capital, size of the enterprise, product uniqueness, effective tax rate, operational risk, dividend policy, non-interest tax shield. Whereas, the capital structure (the endogenous variable) is determined with the use of different indicators depending on the study, such as: the

ratio of the debt capital to equity and equity to the debt capital (Łach 2012, pp. 189-190, 194).

It was in the examinations carried out that the capital structure was taken as an endogenous variable (Y) (the capital structure ratio = the equity capital / the debt capital). On the basis of the literature on the subject, a list of the potential determinants of the capital structure was created. Then, taking into account the limitations resulting from the data availability, the list mentioned above was verified and the following exogenous variables were taken to carry out the examinations:

X1 - structure of assets (fixed assets / total assets),
X2 - return on sale (net profit / sales revenue),
X3 - return on assets (net profit / total assets),
X4 - financial liquidity (current assets / current liabilities),
X5 - size of the enterprise (sales revenue),
X6 - development prospects (percentage change in the total asset value),
X7 - effective tax rate (income tax / profit before tax).

The most well-known and used indicator of the relation between two measurable variables is a classic Pearson correlation coefficient (Zeliaś 2000, p. 80). It should be borne in mind that a simple linear correlation coefficient may be considered as an indicator of the strength of the relation between the studied variables only if:

• independent variable is the only factor affecting the dependent variable,
• the studied relation between variables is linear.

However, if one of these two conditions is not met, the interpretation of the correlation coefficient as a measure of the strength of the dependency of the dependent and independent variable is not justified (Guzik 2008, pp. 55-56).

In the analysis presented in a lesser article, the first condition is not satisfied, because the return on equity depends on more than one variable. Therefore, the correlation coefficient can only be used to measure the similarity between the direction of changes in the two studied variables and the degree of harmonization of their course.

Correlation coefficients between indicators of Du Pont mode shown in table 1l was shown in table 3. This ratio assumes the values within the range of <-1, +1>. The sign informs on the correlation direction and its value on the strength of the relation. It is assumed that if the ratio is (Zeliaś 2000, s. 82):

• less than 0,2 - there is no linear relation between the variables,
• from 0,2 to 0,4 - there is a distinct but small linear relation,
• from 0,4 to 0,7 - a relation is moderate,

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- from 0,7 to 0,9 - a relation is significant,
- above 0,9 - a relation is very strong.

Table 3. Pearson correlation coefficients

	X1	X2	X3	X4	X5	X6	X7
Y	0,29	-0,26	0,09	0,71	-0,22	0,53	0,03

Source: own study based on the annual reports of the companies analysed

The analysis of the correlation coefficients presented in the table 3 indicates that in the companies belonging to the construction industry in the analysed period:
1. The directions in changes of the capital structure and the financial liquidity were significantly similar (harmonized). The increasing (decreasing) relation of the equity capital to the debt capital was accompanied by the significantly increasing (decreasing) financial liquidity.
2. The directions in changes of the capital structure and of the indicator of the development prospects were moderately similar (harmonized). The increasing (decreasing) relationship of the equity capital to the debt capital was accompanied by moderately increasing (decreasing) percentage change of the total asset value.
3. The directions in changes of the capital structure and of the assets structure, of the capital structure and the return on sales as well as assets structure and the size of the enterprise were little similar (harmonized).
4. The capital structure was not correlated with the return on assets and the effective tax rate.

It was in order to identify the factors affecting the capital structure of the examined enterprises as well as to examine the strength and the direction of their influence that the multivariable regression method was also applied (Borkowski, Dudek, Szczesny 2003). The backwards stepwise regression method was applied in order to select the variables for the model.

Table 4 shows the coefficients of the linear regression between the capital structure and the statistically significant explanatory variables (with $\alpha = 0,05$) and the additional regression statistics, ie. standard error values for the coefficients and constant, coefficient of determination (R^2) and the value of t-Student test. Additionally, in the analysis was used the beta coefficient, which indicates

the relative importance of independent variables on the dependent variables (Goldberger 1964).

Table 4. Linear regression coefficients between the capital structure (Y) and a statistically significant independent variables Xi

Xi	Coefficients	Standard Error	β	t-student test
X1	2,90	1,13	0,18	2,55
X2	-3,32	0,65	-0,37	-5,13
X4	2,47	0,23	0,74	10,58
X6	0,02	0,005	0,24	3,55
Constant	-6,01	0,77		-7,80
Determination coefficient - R^2 (%)	80,47			

Source: own study based on the annual reports of the companies analysed

The following conclusions can be drawn from the data presented in the table 4:
1. The variables adopted in the regression model explained the changeability of the capital structure to a high degree (80,5%).
2. In the regression model of the capital structure, the independent variables X1, X2, X4 and X6 turned out to be essential and the variables X3, X5, X7 were not important.
3. It was in the examined enterprises that:
   - the increase in the relationship between fixed assets and total assets by 0,1 resulted in the increase in the relationship between the equity capital and the debt capital by 0,29,
   - the increase in the return on sale by 0,1 was translated into decrease in the relation between the equity capital and the debt capital by about 0,332,
   - the increase in the financial liquidity by 0,1 was translated into increase in the relation between the equity capital and the debt capital by about 0,247,
   - the increase in the percentage change of the total asset value by 1% was translated into the average increase in the relationship between the equity capital and the debt capital by 0,02.

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4. From the point of view of the β indicator, it is the financial liquidity that has the fundamental importance for the examined enterprises. While taking into account the β indicator, the relative influence of the financial liquidity on the capital structure was about 4 times stronger than the influence of the assets structure; 3 times stronger than the influence of the development prospects and 2 times stronger than the influence of the return on sale.

7. Conclusion

The presented analysis and the evaluation of the capital structure as well as the identification of the selected factors affecting the capital structure of the enterprises belonging to the construction industry allow for drawing the following conclusions:

1. In the analysed period, there was a change in the capital structure of the examined enterprises. In the years 2009-2010, the share of the equity capital in the sources of financing increased and the share of the debt capital decreased. Whereas in the years 2011-2012, the share of the debt capital increased and the share of the equity capital decreased.
2. The analysis of the correlation coefficients indicates the directions of changes in the capital structure and the financial liquidity were significantly similar. The directions of changes in the capital structure and in the indicator of the development prospects were moderately similar. Whereas the directions of changes in the capital structure and the assets structure, the capital structure and the return on sale as well as the capital structure and the size of the company were little similar.
3. It was according to the multivariate regression method that out of the factors used in this study; these were the return on sale, the financial liquidity and the development prospects that affected the capital structure of the examined enterprises.
4. From the point of view of the β indicator, it was the financial liquidity that had the major impact on the capital structure of the enterprises.

Summary

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These are the issues related to shaping the capital structure of enterprises that are fundamental problems of corporate finances. Capital structure has been of interest to the researchers in the field

of finance theory for over 60 years. However, the studies of the literature indicate that there was relatively little research on the capital structure and the factors shaping it in Poland. The purpose of this article is to identify and to examine the strength and the direction of the influence of the selected microeconomic factors on the capital structure of the enterprises belonging to the construction industry and quoted on the NewConnect share market. It is in order to accomplish this objective that the correlation analysis and the linear regression methods were applied.

The enterprises being the object of the analysis are companies quoted on the NewConnect share market. At the very moment, there are 32 companies belonging to the construction industry quoted on this market. Out of this group, there were 15 companies selected for the needs of this study, because they met the selection criterion, which was the publication of the financial data for the period 2009-2012.

Key words: *capital structure, determinants of the capital structure, correlation analysis, regression analysis.*

Streszczenie

Wpływ wybranych czynników na strukturę kapitału przedsiębiorstw sektora budowlanego

Jednym z podstawowych problemów w finansach przedsiębiorstw są zagadnienia związane z kształtowaniem struktury kapitału. Struktura kapitału jest przedmiotem zainteresowania badaczy z zakresu teorii finansów od ponad 60 lat. Studia literatury wskazują jednak, że stosunkowo niewiele badań dotyczących struktury kapitału i kształtujących ją czynników zostało przeprowadzonych w Polsce. Celem artykułu jest zidentyfikowanie oraz zbadanie siły i kierunku wpływu wybranych czynników mikroekonomicznych na strukturę kapitału spółek zaliczanych do sektora budownictwo, notowanych na rynku akcji NewConnect. Do realizacji tak postawionego celu wykorzystano analizę korelacji oraz metodę regresji liniowej.

Zbiór przedsiębiorstw będący przedmiotem analizy to spółki notowane na rynku akcji NewConnect.

Na rynku tym notowane są obecnie 32 spółki zaliczane do

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budownictwa. Spośród tej grupy na potrzeby niniejszych badań wybrano 15 spółek. Spełniły one bowiem kryterium wyboru, którym było opublikowanie danych finansowych za okres 2009-2012.

Słowa klucze:	*struktura kapitału, determinanty struktury kapitału, analiza korelacji, analiza regresji.*

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