



## Determinants of Debt-Equity Choice – Evidence From Poland

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### Abstract

The question of debt-equity choice has so far been widely discussed in literature. The aim of the paper is to analyse the determinants of capital structure of Polish enterprises. We analysed factors that may impact the indebtedness. This analysis fills in the gap in worldwide studies with the case of a country representing the group of emerging markets. The paper examines capital structure determinants of non-financial companies listed on the Warsaw Stock Exchange. We used five independent variables compatible with the up-to-date achievements in the field. The results indicate that there is an evidence of a significant negative relationship among the size of a company, its growth rate, profitability, tangibility and the level of total debt.

The study shows positive relationship between growth prospects of the company and the debt level. The results of the study indicate that the pecking order theory better explains the changes in indebtedness of analysed companies than other capital structure theories. Obtained results are mostly consistent with earlier studies conducted in the Poland and with studies in Western economies.

**Keywords:** Capital Structure, Trade-Off Theory, Pecking Order Theory, Poland, Emerging Market



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# Determinants of Debt-Equity Choice – Evidence From Poland

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## 1. Introduction

Capital structure of an enterprise and its impact upon the functioning of a business and its value was, is and will remain the subject of numerous studies and analyses. Two the most important capital structure theories, which explain the behaviour of entrepreneurs when it comes to the choice of the source of funding are the trade-off theory based on the accomplishments of F. Modigliani and M. Miller (1958) and the pecking order theory developed by S.C. Myers (1984) and S.C. Myers and N.S. Majluf (1984). According to the trade-off theory, optimal capital structure is the outcome of compromise between benefits and costs of debt. Under the trade-off theory, optimal capital structure level is identified by the debt to equity ratio, for which risk accompanying the debt is compensated with tax benefits connected with debt servicing. Nevertheless, S. Myers (1984) concludes that we still do not know how enterprises shape their capital structure. In his considerations he makes references to the theory of dividend policy and limited knowledge on optimal solutions for paying out dividends. He analyses the results of studies conducted and published by G. Donaldson (1961) discussing modes of financing in large US enterprises, which demonstrated that they prefer internal sources of funding. Results obtained by G. Donaldson had been ignored for a rather long time as no explanations could be found for such a behaviour. G. Donaldson himself decided that managers included in the study were not guided by the wish to maximise shareholder value. Finally, S.C. Myers and N.S. Majluf (1984) presented theoretical justification for the above results based on the signalling properties of specific capital and by that they formulated the assumptions of the pecking order of theory.

In accordance with the assumptions of the pecking order theory, capital structure of an enterprise is determined by the preference of internal over external sources of funding. When internal sources are insufficient, debt is preferred over equity, meaning credit or the issuing of bonds comes first and only when these possibilities have been exhausted, new stock is issued. High profits encourage managers to accumulate financial surpluses rather than to increase debt, even though the

latter would bring tax benefits (under the trade-off theory).

Trade-off theory may be explained from the perspective of information asymmetry and transaction costs. Managers have better access to information than external investors. S.C. Meyers (1984) claims that information asymmetry and transaction costs exceed forces, which identify optimal financial leverage in the trade-off model. To minimise financial costs, enterprises prefer to start financing investment projects with internal resources. Only if additional financing is necessary, they use external capital, starting from secure debt. Thus, contrary to the trade-off theory, the pecking order theory does not foresee any long-term coefficient for capital structure. There is no optimal structure of capital as there are two types of equity: Retained profit (preferred by the pecking order theory) and capital acquired from issuing new shares (avoided under the pecking order theory).

The choice between equity and debt financing has been widely discussed in literature. Studies were mainly oriented at the verification of the compatibility of the above mentioned theories with economic practice. The paper forms a part of this group of studies. Its main goal is to analyse the determinants of the capital structure of Polish enterprises. We analysed factors that may impact debt. The analysis complements worldwide research with the specificity of a country representing emerging markets, with well developed banking sector, potential source of debt, and capital market meeting the needs of equity funding.

This paper is organized as follows: Section 2 provides a literature review, section 3 refers to empirical research on capital structure in Poland, section 4 presents data description, research methodology and hypotheses, results and the analysis are provided in section 5, summary is presented in section 6.

## 2. Literature review

Research studies on the structure of capital test many dependant variables as proposed by, inter alia: Bradley et.al. (1984), Haris and Raviv (1991), Rajan and Zingales (1995), Bevan and Danbolt (2002), who observed that the capital structure of an enterprise is mostly influenced by the size, profitability, tangibility, growth rate, and growth prospectus.

### Size of the company

Many authors indicate that the main determinant of the capital structure of an enterprise is its size. However, results of studies on the impact of the size of an enterprise upon the structure of its capital are rather ambiguous. In accordance with the trade-off theory, there is positive relationship between the size of a company and the leverage, which is due to the fact that large companies are more diversified and less threatened with the risk of bankruptcy. The pecking order theory shows

negative relationship between the size of a firm and its financial leverage. Kester (1986) draws attention to the problem of information asymmetry between the board and capital market, smaller in large companies and by that making them more capable of issuing equity.

Studies by Rajan and Zingales (1995) indicate that the debt of British firms is positively correlated with their size. Positive correlation between the size of an enterprise and debt was also confirmed by Bevan and Danbolt (2002), who, however, observed that the relationship is very specific and depends on the nature (type) of debt. Results obtained by Barclay and Smith (1996), Demirguc-Kunt and Maksimovic (1999) confirm that debt maturity is positively correlated with company size. No evidence for the impact of the size of a company was detected by Remmers et.al. (1974). While Kester (1986) suggests a statistically non-significant negative relationship between debt and company size.

Natural logarithm of total assets will be the indicator for firm size in this study. Thus, based on the firm size and according to the pecking order theory, we formulate the first hypothesis:

H1: It is hypothesized that the level of leverage is negatively related to company size.

### **Profitability**

Under the pecking order theory of Myers and Majluf (1984), company's management prefers internal sources of funding over external ones and they usually use retained profits followed by debt and at the very end they decide to issue new equity. Myers suggests the behaviour may be caused by the cost of issuing new equity. When analysing such costs, Myers and Majluf highlight the issue of information asymmetry and transaction costs. According to the theory, there is negative relationship between profitability and debt. Enterprises with higher profitability generate higher cash flows and, as a result, enough net profit to be used as internal source of financing. Thus, enterprises may strive to reduce debt.

Taking account of the tax shield effect, enterprises may prefer debt over equity. That, in turn, would suggest negative relationship between company profitability and its debt. Negative relationship between debt and profitability in US and Japanese enterprises was confirmed by the studies of Kester (1986). Titman and Wessels (1988) also confirm the above relationship for US companies. Rajan and Zingales (1995) conducted a study among companies from G-7 countries. Wald (1999) analysed enterprises from developed countries, Booth et.al. (2001) focused on enterprises from developing countries, while Huang and Song (2006) conducted an analysis of Chinese enterprises. All of them confirmed negative relationship between the profitability and debt.

The return on assets (ROA) ratio will be the indicator of profitability. Thus, based on the firm profitability, we formulate the following hypothesis:

H2: There is a negative relationship between the level of debt and the level of profitability.

### **Tangibility**

The asymmetric information theories of capital structure suggest there is a conflict of interest between lenders and shareholders (Jensen and Meckling, 1976). Debt providers are exposed to default risk, hence they expect some guarantee for the debt. They usually require the debt to be secured by fixed assets. Thus, the tangibility may become the main determinant of debt in enterprises (Scott, 1977; Williamson, 1988; Harris and Raviv, 1990).

The relationship where enterprises with higher share of fixed assets in total assets use more debt as the source of financing was confirmed in the studies of Breadley et.al. (1984), Titman and Wessels (1988), and Rajan and Zingales (1995). This positive relationship is based on the assumptions of the agency theory.

In this study, the fixed assets over total assets ratio will be the proxy for asset tangibility. We expect that debt level is positively related to tangibility; therefore we formulate the following hypothesis:

H3: There is a positive relationship between leverage and tangibility.

### **Growth**

Myers and Majluf (1984) analyzed a firm with assets in place and a growth opportunity requiring additional financing. In this analysis the main assumption concerns perfect financial markets, except that investors do not have information about true value of existing assets and opportunities. Therefore, investors cannot precisely value the securities needed to finance the new investment. Trade-off theory suggests that the costs of financial distress (the costs that arise, when a company cannot meet its financial obligations) is the key factor of leverage. Myers (1977) argues that this cost is higher for companies whose value is primarily affected by intangible investment opportunities or growth options. Therefore, lenders may be unwilling to finance firms of this type, so they will be less leveraged than mature companies whose value reflects cash flows from tangible assets in place.

In accordance with the above, Titman and Wessels (1988), Chung (1993), and Rajan and Zingales (1995) confirm negative relationship between growth opportunities and total debt. Kester (1986) cannot find any confirmation for expected negative correlation between growth opportunities and debt. Studies of Bevan and Danbolt (2002) indicate there is negative correlation between growth opportunities and total debt.

With regard to growth, two indicators are used in this research. The percentage change of total assets will be used as the indicator of growth rate - growth in total assets can be viewed as growth in tangibility. Growth prospects will be measured by the ratio ((total assets –

net book value + market value) / total assets). Growth prospects inform about investors' expectations when it comes to future growth of the company; relatively high ratio may suggest investors anticipate dynamic growth of a company in the future hence their inclination to high market evaluation compared to the book value of assets. Based on the growth rate we can formulate the next hypothesis:

H5: Relationship between debt level and growth rate is negative.

Based on the growth opportunities we formulate the fourth hypothesis:

H4: Relationship between debt level and growth opportunities is negative.

### 3. Capital structure research in Poland

Studies on the structure of capital have been conducted in Poland since the 1990s. They were conducted, inter alia, by J. Gajdka (2002), who analysed two groups of companies; the first one included 48 companies (except for the financial sector) listed at the Warsaw Stock Exchange from 1995 until 1997, the second one included 106 companies, which in any year within the adopted period were listed at the Warsaw Stock Exchange. Gajdka's results demonstrate that profitability relatively well explains changes in the structure of capital. Studies also show a reverse relationship between operating profit to sales ratio and the variable, which describes increase in debt, which is in line with the assumptions of the pecking order theory for the sources of financing and would allow concluding that analysed companies preferred internal sources of financing.

Studies of W. Frąckowiak, S. Gryglewicz, P. Stobiecki, M. Stradomski, and A. Szyszka (2005) concerning non-financial listed companies (1992-2002) compared to selected European countries (United Kingdom, Germany, and France; 1988-2002) indicate that enterprise growth perspectives negatively impact debt maturity structure. Besides, in all countries it was observed that the share of tangibility and fixed assets are relevant for long-term debt and total debts. The authors conclude that enterprises adjust maturity deadlines of debt to the age structure of assets. Studies confirm negative impact of the size of an enterprise on the share of fixed assets and the relationship between liquidity and the share of long-term capital; higher liability is connected with higher share of long-term capital.

K. Mazur (2007) researched a group of 238 companies listed in the Warsaw Stock Exchange over the period 2000-2004. Results indicate that enterprises with higher profitability and liquidity prefer internal sources of financing. The relevance of the impact of assets

structure and the size of a company upon capital structure was also confirmed. K. Mazur concludes that the pecking order theory seems to better predict the relevance and direction of impact of analysed factors upon changes in capital structure.

E. Chojnacka (2011) studied companies listed at the Warsaw Stock Exchange in the period 2002-2008. The author claims that the pecking order theory somehow explains changes observed in debt in groups of analysed companies [Chojnacka, 2011: 212]. Results show that the main explanatory variable of the change in debt is the shortage of internal sources of funding, however, the intensity of its impact is lower than suggested by the theory.

### 4. Data and methodology

The analysis focused on the group of 111 companies listed at the Warsaw Stock Exchange. These were non-financial companies listed throughout the entire analysed period, i.e., in the years 2002-2012. Research sample consisted of 1211 observations. Companies represented a variety of sectors. In accordance with the methodology adopted by the Warsaw Stock Exchange, 17 companies represented construction, 12 metal industry and 9 electro engineering, IT, wholesale trade, 8 companies were categorised as representing textile and food processing industries, 7 developers, 4 companies from media, construction materials and wood processing, respectively, 3 companies from retail, telecommunication, and automotive industry, 2 from energy sector and plastics plus single representatives of hotels, raw material and fuel industries; 4 companies were identified as other sectors. The size of companies measured with market capitalisation also varied. However, at this point we should stress the specificity of the Polish market, much smaller than developed capital markets, which resulted in rather limited share of high market value companies in the sample. Considering market evaluation as at the end of December 2012 and the then USD/PLN exchange rate, it was found out that 25 companies were of market value below USD 10 million, 36 companies were worth more than USD 10 million but less than USD 50 million, 14 companies were worth more than USD 50 million but less than USD 100 million, 26 companies were worth between USD 100 million and USD 500 million, and 10 the largest companies were worth more than USD 500 million.

Data used to analyse the determinants of capital structure in researched companies were taken from the EMIS database. Financial data were taken from annual consolidated financial statements. Where no statements were available, we used the statements of individual companies. Data on stock prices come from the Warsaw Stock Exchange quote service.

The data were cross-sectional and time related but also panel and balanced. In such cases, relationships between variables can be studied using the ordinary least squares (OLS). We need to bear in mind, however, that no individual effect may appear. This is why we conducted three stages of research procedure. First, using the Breusch-Pagan test we checked whether it is justified to introduce individual effects. When no grounds were found for rejecting the zero hypothesis, we assumed that a given panel model can be estimated using ordinary least squares (OLS). Where the test produced high values (LM multiplier), we rejected the zero hypothesis in favour of an alternative one and introduced individual effects. In the next stage we performed Hausman test to choose between fixed effects and random effects. High value of H coefficient of the Hausman test suggested the model with fixed effect, low value was indicative of random effect. In the last stage we estimated variables using a selected model: One way fixed model or one way random model.

The test was to analyse determinants of capital structure. Hence in the model we used the TD/TA – total debt to total assets ratio as a response (dependent) variable.

In the test we used five independent variables consistent with the so far achievements in this area presented in part 2.

- Firm size - natural logarithm of Total assets - ln(TA)
- Profitability – return on assets ratio (ROA), which measures the efficiency of companies and the use of their assets
- Assets tangibility – fixed assets divided by total assets (FA/TA), the coefficient analyses the structure of assets, which may determine decisions on how to finance the assets.

With regard to growth, there are two variables:

- Growth opportunities – (growth rate) *change of total assets* – increase in total assets treated as the measure of company’s growth rate
- GP – ((total assets – net book value + market capitalisation) / total assets); growth prospects inform about investors expectations with respect to the future growth of a company; relatively high ratio may mean that investors anticipate future dynamic growth of a company, hence the tendency to high market valuation compared to book value of assets.

Considering earlier studies, we used the following panel regression model to analyse determinants of capital structure:

$$(TB/TA)_{it} = \beta_0 + \beta_1 \ln(TA)_{it} + \beta_2 ROA_{it} + \beta_3 (FA/TA)_{it} + \beta_4 GR_{it} + \beta_5 GP_{it} + v_{it}$$

All dependent variables are represented by selected parameters of *i*-companies in *t*-time units (years), and  $v_{it}$  is the total random error.

### 5. Results and analysis

Basic statistics for analysed parameters are presented in Table 1. Tested variables seem relatively little diversified. Average values do not diverge significantly from the median. The least diversification was observed for tangibility (FA/TA) and firm size (ln(TA)). The biggest differences were found in parameters describing growth (GR and GP). Thus we obtained an interesting group of similar enterprises, which pursue similar asset management policy but have significantly different growth prospects differently perceived by investors.

**Table 1. Descriptive Statistics**

Variables	Mean	Median	Standard Deviation
TD/TA	0,5284	0,4706	0,5272
ln(TA)	12,2651	12,2502	1,8488
ROA	0,0124	0,0341	0,1688
FA/TA	0,4847	0,4866	0,2006
GR	0,2428	0,0369	1,4218
GP	1,5095	1,0853	2,4816
<b>Number Of Observations</b>	1221		

Source: Own studies.

Descriptive statistics/variables are linked with specific relationships presented in Table 2. First of all, we can observe reverse relationship of variables connected with growth prospects with firm size and asset tangibility. The relationship seems rather obvious. Large enterprises have limited growth opportunities, in particular in real terms and investors do realise it. However, the relationship is so weak that the above conclusions do not authorise to make any further generalisations. The strongest relationship was observed for the couple ln(TA) and FA/TA. It also seems obvious. Enterprises pursuing a specific asset management policy maintain their structure.

**Table 2. Correlation Matrix of Independent Variables**

Variables	ln(TA)	ROA	FA/TA	GR	GP
ln(TA)	1,0000				
ROA	0,1892	1,0000			
FA/TA	0,2879	-0,0222	1,0000		
GR	-0,0023	0,1322	-0,0509	1,0000	
GP	-0,1944	0,0382	-0,0858	0,0474	1,0000

Source: Own studies.

Low correlation of independent variables presented in Table 2 justifies further analysis of debt determinants. We started with identification which variables, and how, impact the relationship between total debt and total assets (TD/TA) in non-financial enterprises. For the model analysing the impact of determinants on total debt in companies, Breusch-Pagan and Hausman tests provided arguments for applying fixed effects model. Breusch-Pagan test showed the value of 337.29 (probability 0.0000) and Hausman test 33.26 (probability 0.0000). Estimated independent variables for (TD/TA) variable are given in Table 1. All of analysed variables exerted statistically significant influence on the dependent variable  $\ln(TA)$  (negative influence for  $p < 0,01$ ), ROA (negative influence for  $p < 0,05$ ), FA/TA (negative influence for  $p < 0,01$ ), GR (negative influence for  $p < 0,01$ ), and GP (positive influence for  $p < 0,01$ ). Adjustment degree of the model measured with adjusted R-square was 31.05%.

**Table 3. Analysis of Impact of Selected Determinants upon (TD/TA)**

Variables	Coefficient	Stand. Error	t-Student	P Value
const	1,28086	0,19005	6,7394	<0,00001***
$\ln(TA)$	-0,04998	0,01589	-3,1457	0,00170***
ROA	-0,20308	0,08631	-2,3530	0,01880**
FA/TA	-0,37884	0,11213	-3,3787	0,00075***
GR	-0,03483	0,00948	-3,6745	0,00025***
GP	0,03656	0,00597	6,1251	<0,00001***
R-square = 0,37551				
Adjusted R-square = 0,31051				
$F test = (115,1105) = 5,77765 (p < 0,00001)$				

Significant variable at \*  $p < 0,10$ , \*\*  $p < 0,05$ , \*\*\*  $p < 0,01$

Source: own studies.

All of the five studied variables were statistically significant. By analysing estimates obtained from the panel model, we can conclude that all analysed variables, with the exception of ROA, were statistically significant for  $p$  lower than 1 percent.

The results indicate that there is an evidence of a significant negative relationship between the size of a company and the level of total debt. This supports hypothesis H1 and is consistent with the pecking order theory of capital structure.

The impact of  $\ln(TA)$  was negative, which could be indicative of larger companies being characterised with lower debt as, in accordance with the pecking order theory, they prefer internal over external sources of financing.

As expected, there is evidence of a significant negative relationship between the level of debt and profitability. This supports hypothesis H2 and is consistent with the

findings of Titman and Wessels (1988), Rajan and Zingales (1995), Booth et al. (2001), Huang and Song (2006). The above relationship means that companies representing higher profitability carry lower debt, which is consistent with the assumptions of the pecking order theory, because they use their own financial surpluses to avoid incurring debt.

The results indicate that there is an evidence of a significant negative relationship between growth rate and the level of total debt. This supports hypothesis H4 and is consistent with what Titman and Wessels (1988), Rajan and Zingales (1995) concluded.

Results of the study suggest negative relationship between tangibility and debt level, meaning hypothesis H3 was not confirmed. Neither was H5 hypothesis since the study confirmed positive relationship between growth prospects and debt level. The above results mean that companies with lower growth dynamics measured with the rate of increase in assets are characterised with higher share of debt financing. That would mean companies unable to work out adequate capital are trying to acquire it by incurring debt. Negative impact of (FA/TA) upon response variable should be interpreted as a lower propensity to incur debt observed in companies with higher share of fixed assets. We may thus conclude that, managers in companies want to finance as much fixed assets as possible with secure equity with unspecified maturity date. GP variable in the model positively impacts (TD/TA) meaning the companies well evaluated by investors with relatively high market valuations have higher share of debt in assets financing. It suggests that positive perception of companies by investors facilitates the acquisition of external financing. Summing up the results we need to stress, however, that the ability of the model to explain the dependent variable (TD/TA) was rather limited and adjusted R-squared was 0.31.

Results of the study demonstrate that the pecking order theory better explains changes in the level of debt in analysed companies. They are also consistent with earlier studies conducted in Poland and in Western countries (Titman and Wessels, 1988; Rajan and Zingales, 1995).

Different results were obtained for two variables: tangibility and growth opportunities. We must remember, however, that all variables significantly impact the level of debt of an enterprise.

## 6. Conclusions and discussion

Studies devoted to the propensity of Polish companies listed at the Warsaw Stock Exchange to incur debt do not allow confirming all proposed hypotheses. First of all, attention is drawn to reversed relationship between debt and firm size. Obtained results confirm the findings of the pecking order theory. That would mean there is information asymmetry between the management and investors. However, considering the conditions of the Polish financial market we may note that it is its very

nature that may determine financing policy of enterprises. Debt is supplied mainly by the banking sector, which limits possibilities of any alternative financing. A growing enterprise may face increasing problems with incurring debt. We analysed listed companies, which had an obvious alternative to issue equity. Decreasing share of debt in larger operators may reflect their specific unwillingness to take financial risk and the shifting it over to the shareholders. Such policy has got its pros and cons. Decreasing leverage indicates underused economic potential of a business. This is an example of a conservative financing strategy: Safe, free of substantial risk of bankruptcy but restricting profitability. It is also confirmed by other results of studies. Negative relationship between the level of debt and profitability provides further evidence. It may mean insufficient profitability resulting from equity financing. Investment projects are too conservative. That is why companies cannot use their development opportunities to the fullest potential. Aversion to debt observed among larger enterprises may also result from their limited possibilities to use the tax shield. Under such circumstances, having higher profitability may be little beneficial from economic point of view as the company will pay too much of its surplus in taxes.

Obtained results may as well be indicative of ineffective use of the debt in an enterprise. On the other extreme to debt and profitability there are more indebted companies, which perform worse than those which apply a more conservative financing strategy. Well functioning enterprises, which use debt in their strategy should achieve better net results because of the tax shield. Hence, if an increase in assets (debt) is not accompanied by higher increase in profit, debt financing does not pay off. If we add on the risk of losing liquidity, debt financing may be given up. Enterprises included in the study seem to experience such a relationship and they prefer safer equity financing. We should remember, however, that when we compare the profitability of less and more indebted companies in nominal terms, the first group performs better. Companies of a similar size and achieving similar gross profit have different net profitability. In order to have a similar net profitability, indebted companies would have to have higher gross profitability. That may provide another explanation for the relationship between ROA and total debt.

The tangibility hypothesis was not confirmed either. Increased debt is not accompanied by the increase in fixed assets value. It means, the enterprises covered by the analysis do not use fixed assets to secure their debt. Apparently, however, this relationship results first and foremost from the reversed relationship between firm size and its debt. Similar observation was made for growth rate of an enterprise and debt. That means enterprise growth, including fixed assets, is not

accompanied by increased debt. It does not prejudice, however, changes in fixed assets value. Observed relationship corresponds with the rest, which suggests conservative financing strategy. Negative relationship between tangibility and debt means fixed assets are mostly financed with equity. This may also be interpreted two ways. On the one hand, it is a positive characteristic since it enables the increasing of the leverage in the future and using fixed assets as collateral. On the other hand, it may result from low productivity of fixed assets making them unacceptable as collateral.

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