Market Performance and Capital Structure of the Companies Listed on the Warsaw Stock Exchange in Poland

Ewa Majerowska and Magdalena Gostkowska-Drzewicka

Abstract The purpose of this study is to examine the effect capital structure has on the market performance of the companies listed on the Warsaw Stock Exchange in Poland in 2000–2015 as well as to present the empirical evidence of its significance using a panel data approach. The study was based on data obtained from the annual financial statements contained in the Notoria database and published on the Warsaw Stock Exchange. We used Tobin's Q ratio and the market value of equity to book value of equity (MBVR) as the measure of corporate performance. When Tobin's Q was modelled, the level of leverage proved to be significant. It means that the company's capital structure affects its performance. The sign between both variables, LEVERAGE and Tobin's Q, is positive which is in line with trade-off theory. The dynamic panel data modelling approach allowed the conclusion that, irrespective of the measure selected (Tobin's Q or the MBVR), the value of the measure depends positively on its value in the previous year. It means that a high performance noted in a previous year constitutes the basis for good results in the following year.

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1 Introduction

Capital structure has been the subject of many studies in the field of corporate finance and it is often associated with a company's financing decisions. These decisions affect a company's ability to thrive in a competitive environment as its ability to maximize shareholder value (Abor, 2005). Contemporary capital structure theories have varied since the early works of Durand (1952), who postulated that an "optimal" capital structure should contain the amount of debt which maximizes the company's total value. The Modigliani and Miller irrelevance theory (Modigliani and Miller, 1958), on the other hand, provides the foundation for the ongoing search for an optimal mix of equity and debt which would maximize the company's value. This concept has been developed and modified resulting in new theories such as: The arbitrage theory, the information asymmetry theory, the pecking order theory, the agency theory, the trade off theory and the signalling theory. These theories suggest that capital structure can have a major impact on corporate performance (Bandyopadhyay and Barua, 2016).

Therefore, the purpose of this study is to examine the effect capital structure has on market performance in the companies listed on the Warsaw Stock Exchange in Poland in 2000–2015 as well as to present the empirical evidence of its significance by using a panel data approach. Additionally, we analysed the influence of the explanatory determinants commonly used in the literature on corporate performance: Growth opportunities, the company's size and its asset structure. Implementation of the aim and verification of the hypothesis required application of econometric models. The study was based on data obtained from the annual financial statements contained in the Notoria database and published on the Warsaw Stock Exchange. Calculations were made using the Gretl v. 2018b package, which was originally written by Allin Cottrell, Wake Forest University, and which is

> *"* (...) *a cross-platform software package for econometric analysis, written in the C programming language. It is free, open-source software. You may redistribute it and/or modify it under the terms of the GNU General Public License* (*GPL*) *as published by the Free Software Foundation."* (Cottrell and Lucchetti, 2019)

The paper is organized as follows: Subsequently to the introduction, the second section, discussing the reviewed literature, is presented. The third section presents the hypotheses. The fourth one describes the dataset, the methodology

and the empirical models used to investigate how capital structure affects corporate performance. The fifth section shows the empirical results, while the sixth, the last one, concludes the paper.

2 Literature Overview

2.1 Conceptual Studies on Capital Structure

A very influential work by Modigliani and Miller (1958) introduces the capital structure irrelevance theory which holds that the choice of a company's capital structure is irrelevant to its value. However, this theory was based on restrictive assumptions, which do not correspond with reality. When these assumptions are removed, then choice of capital structure becomes an important, value-determining factor. After considering taxes in the analysis, Modigliani and Miller (1963) proposed that companies use the debt, due to tax-deductible interest payments, thus, increasing the value of the company. The benefit of paying less taxes may encourage companies to contract more debt rather than other external sources of finance. There are two kinds of costs associated with debt: The bankruptcy costs and the agency costs. Bankruptcy is a mechanism which allows the creditors to take over, when the decline in the value of assets triggers a default. The agency costs refer to the costs generated as a result of a conflict of interest (Jensen and Meckling, 1976). Bankruptcy and agency costs constitute the basis of the trade-off theory (Myers, 1977, 1984; Haugen and Senbet, 1978; Fisher et al, 1989). Under its framework, a company must define a target debt to equity ratio. It means, that an optimal capital structure exists which maximizes the company's value. This theory suggests that debt financing offers more benefits for a company than equity financing. This advantage results from a tax shield on the interest paid on debt. In turn, equity income is charged with tax.

A lot of recent capital structure theories investigate the structure of debt. Optimal debt maturity was first analysed in trade-off models by Leland (1994). He examined the term structure of yield spreads and found that a rise in the interest rates will reduce the yield spreads of current debt issues. Dangl and Zechner (2016) explored the effects debt maturity has on subsequent dynamic adjustment of the capital structure. They indicated that long-term debt maturities destroy the equity holders' incentives to engage in future voluntary

debt reductions. By contrast, short-term debt maturities serve as a commitment to a lower leverage, in times when company profitability decreases. Optimal debt maturity adjustments were also analysed by Brunnermeier and Oehmke (2013) as well as He and Milbradt (2014).

An alternative to the trade-off theory is the pecking order theory. This concept was introduced by Donaldson (1961), then confirmed by Ross (1977) as well as Myers and Majluf (1984). In the same year, the theory was further developed by Myers (1984). It is based on two assumptions. The first one states that managers are better informed about their own company's prospects than its external investors. The second is that managers act in the best interests of the existing shareholders. What is more, the pecking order theory predicts that companies prefer to use internal financing when available and choose debt over equity when external financing is required. In this way, the pecking order theory explains why the most profitable companies have a low debt to equity ratio. This is exactly the reason why they primarily prefer internal financing, not because they have set a low debt to equity ratio. In turn, companies with low profitability are more likely to benefit from debt, because they do not have sufficient sources of internal financing.

2.2 Definition and Measurement of Corporate Performance

Corporate (firm) performance is an ambiguous term, interpreted and measured differently. The firm performance is derived from organizational theory and strategic management, so it needs to be distinguished from the broader construct of organizational effectiveness. Venkatraman and Ramanujam (1986) offered a scheme of three overlapping concentric circles, with the largest representing the organizational effectiveness. This broadest domain includes the medium circle, representing business performance, including the inner circle representing financial performance (see Figure 1).

Santos and Brito (2012) refer to it as business or corporate performance, which is a subset of the organizational effectiveness that covers the operational and the financial outcomes. Performance measures are either financial or operational. Financial performance can be expressed by the return on assets, the return on equity or the market performance measures. Operational performance could be

measured by a growth in the sales and a growth in the market share. It provides a broad definition of performance and focuses on the factors that ultimately lead to financial performance (Chakravarthy, 1986; Hoffer and Sandberg, 1987).

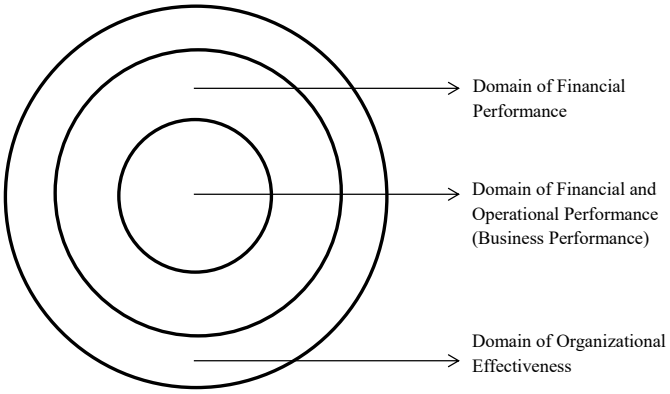

Figure 1: Circumscribing the domain of business performance (source: Venkatraman and Ramanujam (1986)).

The corporate performance measures most commonly used are the return on assets (ROA) and the return on equity (ROE). These accounting measures represent the financial ratios on balance sheets and income statements and are used in many studies (Rajan and Zaingales, 1995; Nawaz et al, 2011; Addae et al, 2013; Gupta, 2015; Igbinosa, 2015). In this context, corporate performance could be defined in terms of a return on assets and a return on equity.

Market performance measures are other measures of corporate performance, i.e. the price per share to the earnings per share (P/E), the market value of equity to the book value of equity (MBVR), and Tobin's Q ratio. They have been used by many researchers (Rajan and Zaingales, 1995; Demsetz and Villalonga, 2001; Zeitun and Tian, 2007; Van Essen et al, 2015). In accordance with Hax and Majluf (1984), we use Tobin's Q ratio as a measure of corporate performance in this study.

Tobin's Q ratio is a ratio between the physical assets' market value and its replacement value. It was first introduced by Kaldor (1966) as a valuation ratio, i.e. the relation of the shares' market value to the capital employed by a company. Brainard and Tobin (1968) state that the market valuation of the equity related

to the replacement cost of the physical assets is the major determinant of a new investment. It is stimulated when the capital is valued on the market as higher than what it costs to produce it. Inversely, when the valuation of the capital is less than its replacement cost, it is not recommended to invest. In their subsequent research, Tobin and Brainard (1976) used the term the "q ratio" for the first time and stated that it is a nexus between the financial markets for goods and services.

A common practice in finance research is to calculate Tobin's Q ratio, by comparing the market value of equity plus the book value of debt with the book value of equity and debt, since it is difficult to estimate the replacement cost of a company's asset value (see, e.g. Zeitun and Tian (2007)). The ratio could also be calculated as a ratio of the market value of equity and the book value of debt to the book value of assets.

2.3 Empirical Studies on Corporate Performance Modelling

Many economists focused their studies on the relationship between the capital structure and a firm's profitability, producing mixed results. Some of these papers are shown in Table 1.

Bandyopadhyay and Barua (2016) examined the association between the choice of capital structure and company performance. They investigated the difference in the behaviour of firms under different macroeconomic scenarios. Their results show that choice of capital structure as well as corporate performance vary, depending on industry affiliation, group ownership and firm specific factors as well as on the condition of the macroeconomic cycle.

Yinusa et al (2016) found that firm performance is statistically significantly negatively related to the capital structure of firms. Moreover, past performance of a firm impacts its capital structure. Based on this study, it is recommended that the firms on emerging markets may need to improve their financial performance, so they can optimize their capital structure decisions.

Foo et al (2015) examined the relationship between the capital structure and the corporate performance of public, listed oil and gas companies in Malaysia. Their findings show that capital structure is negatively related to a firm's return on equity, suggesting that an increase in the level of the firm's debt would negatively affect its shareholders' return.

Table 1: An overview of empirical studies.

Research Period	Object of Research	Factors Affecting Corporate Performance	Research Method
Bandyopadhyay and Barua (2016)			
1998 – 2011	1594 Indian companies	Capital structure, size, research and development expenditures, macro factors, industry affiliation	Dynamic panel generalized method of moments (GMM)
Yinusa et al (2016)			
1998 – 2012	115 companies listed on the Nigerian Stock Exchange	Growth opportunities, age of a firm, size, asset structure, profitability	Panel generalized method of moments (GMM)
Foo et al (2015)			
2003 – 2013	29 oil and gas companies in Malaysia	Short-term debt to total assets, long-term debt to total assets, total debt to total assets	Panel data regression method
Benerje and De (2014)			
1999 – 2011	130 iron and steel Indian companies	Risk, size, growth, debt service capacity, dividend pay-out, financial leverage, degree of operating leverage, firm's age, size	Multiple-regression analysis
Margaritis and Psillaki (2010)			
2002 – 2005	6146 French manufacturing firms	Capital structure, profitability, size, asset structure, growth opportunities, ownership structure and ownership type	Non-parametric data envelopment analysis (DEA) methods
Zeitun and Tian (2007)			
1989 – 2003	167 Jordanian companies listed on Amman Stock Exchange	Capital structure, growth opportunities, size, risk, industry affiliation, political instability around Jordan	The regression model in the form of the Random Effects model for unbalanced panel data
Berger and Di Patti (2006)			
1990 – 1995	695 US commercial banks	Ownership structure, bank's holding company structure, bank's overall risk, market and regulatory factors, market prices of bank's shares	A two-equation structural model estimated using two-stage least squares (2SLS)

Source: Bandyopadhyay and Barua (2016); Yinusa et al (2016); Foo et al (2015); Benerje and De (2014); Margaritis and Psillaki (2010); Zeitun and Tian (2007); Berger and Di Patti (2006).

Benerje and De (2014) found that company size, its debt-servicing capacity ratio and financial leverage play a major role in affecting financial performance of companies in the iron and steel industry in India. During the pre-recession period (2003–2004 to 2006–2007), they observed that the financial leverage and the debt-servicing capacity ratio played a major role in the industry under examination. In the post-recession period (2007–2008 to 2010–2011), company size, its debt-servicing capacity ratio and its financial leverage had a significant impact on the firm.

Margaritis and Psillaki (2010) investigated the relationship between capital structure, ownership structure and firm performance, using a sample of French manufacturing firms. The study supported the Jensen and Meckling (1976) agency cost hypothesis. A higher leverage was found to improve performance, in terms of efficiency, for the entire set of the data. They also documented that alignment of the entrenchment agency effects of ownership concentration vary across industries and across the concentration ratios. They reported that more dispersed firms face higher agency costs. They also found that family firms outperform non-family ones. The quantile regression used to estimate the leverage model for testing the efficiency-risk and the franchise-value hypotheses indicated that efficiency positively affected the leverage in the low to high ranges of the leverage distribution. This provides support for the efficiency risk hypothesis. This is in line with the findings of their previous research (Margaritis and Psillaki, 2007).

Zeitun and Tian (2007) showed that a firm's capital structure had a significantly negative impact on its performance measures, both accounting-wise (ROA and ROE) and in terms of the market measures (Tobin's Q). They also found that the level of short-term debt to total assets has a significantly positive effect on the market performance measure. The Gulf Crisis (1990–1991) was found to have a significant impact on Jordanian corporate performance.

Berger and Di Patti (2006) tested the agency-costs hypothesis, with relation to the US banking industry. The authors used profit efficiency as an indicator of firm performance, as to measure the agency costs and to employ a two-equation structural model that also takes into account the reverse causality from firm performance to capital structure. Their main findings are consistent with the agency-costs hypothesis, i.e. a higher leverage or a lower equity capital ratio are associated with higher profit efficiency in almost the entire range of the data analysed. The effect is both economically and statistically significant.

Our results (see Section 5) suggest that, in Poland, the capital structure of a company affects its performance. The relationship between LEVERAGE and Tobin's Q is positive which is in line with the trade-off theory. It is in contrast with most of the above-mentioned studies. Moreover, the results of these studies indicate that the choice of capital structure varies, depending on the research sample, for example, on the industry affiliation or on the firm-specific factors as well as on the conditions underlying the economic development in the countries analysed. These studies, for this reason, may not be applicable to Poland.

There is a lack of comprehensive research on corporate performance in Poland. Studies concerning the relationship between the leverage and profitability mainly constitute a part of research on the choice of capital structure. However, most of those studies have at least two drawbacks, i.e. they incorporated a relatively small number of explanatory variables and quite old data.

In their work on the determinants of capital structure, Campbell and Jerzemowska (2001) showed the negative relationship between profitability and debt. Skowroński (2002) obtained similar findings. Mazur (2007) suggests that only the firms lacking internal funds use more financing from debt. This is in line with the data previously obtained in Poland. Further research (Hamrol and Sieczko, 2006; Wilimowska and Wilimowski, 2010; Jędrzejczak-Gas, 2014) also showed a negative correlation between the level of debt and profitability. Contrary to previous research, Jerzemowska and Hajduk (2015) found a positive relationship between the capital structure and profitability of the trade-and-service companies listed on the WSE.

3 Hypotheses

The capital structure is one of the main factors that could influence corporate performance. The concept of capital structure is mainly associated with the amount of debt used by a company to finance its assets and is also known as the financial leverage. Theories of capital structure suggest how it might be correlated with profitability. Some of the theoretical predictions regarding this effect are conflicting. Myers and Majluf (1984) propose a negative relationship, since companies prefer to finance their activity using internal funds rather than debt. A negative relation between capital structure and corporate performance (profitability) was also found by Kester (1986); Rajan and Zaingales (1995); Wiwattanakantang (1999); Chen and Strange (2005).

According to Jensen (1986) there is a positive relation, if the market for corporate control is effective and forces companies to commit to paying out cash by levering up. The threat caused by failure to make debt-servicing payments serves as an effective motivating force for such companies to become more efficient. If the market for corporate control is ineffective, managers of profitable firms prefer to avoid the disciplinary role of debt, which would lead to a negative correlation between profitability and debt. Lewellen and Roden (1995) indicated that a company's total debt and profitability are positively related. Another study, carried out by Hadlock and James (2002) based on a sample of 500 non-financial US firms concluded that companies prefer financing by debt, because they anticipate higher returns from a higher level of debt. Fama (1985) argues that bank loans could lead to an increase in a company's performance, because it helps avoid the high information costs incurred in public debt offerings, through issuance of bonds. Thus, the companies more reliant on bank loans are expected to be more profitable. Generally, Majumdar and Sen (2010) indicated that there is a positive relationship between profitability and company's debt. However, they surprisingly found that in terms of some more profitable firms, bank loans have negative effects on profitability. This finding is in contrast to the predictions of the information-cost perspective. It could be explained by the specific institutional context of the Indian financial sector, where most commercial banks are state-owned. Thus, the monitoring of firms by these banks may not be as close as would have been in case if they were privately owned, as it is argued by the agency cost theory. Based on this discussion, the first hypothesis is formulated as follows:

H1 : A company's capital structure affects its performance.

In this study, the capital structure is measured by the ratio of total debt to total assets (LEVERAGE). We used book values for both variables. The assumptions of the trade-off theory and the pecking order theory are often used to explain the factors shaping the capital structure. These factors also could be used to determine corporate performance. In this study, we use three firm variables that are often used in the capital-structure literature: growth opportunities, the firm's size and the asset structure.

Growth opportunities are approximated by the past growth of sales (GROWTH). Companies in the growth phase have a high performance ratio. They are able to generate profit from their investments. Thus, a company's

growth opportunities are expected to be positively related to its performance. As such, the second hypothesis states that:

H2 : Growth opportunities are expected to increase a company's performance.

The SIZE is the growth rate of the book value of a company's assets. It is calculated as a size of company's assets of a given year minus the company's assets of a previous year divided by the size of the company's assets from the previous year. A company's sustainability is in line with its size. Large companies typically diversify their activities, so they have a low risk of losing liquidity. It leads to a reduction of bankruptcy risk (Duliniec, 2015). Wagner (1995) argues that large companies have more bargaining power. As a result, a company becomes more profitable. Further research (Harvey et al, 2001) showed that firm size is significantly and nonlinearly related to profitability. It suggests that, although bigger companies are likely to experience higher profitability, the growth of revenue is likely to slow down faster in larger firms. Based on this discussion, a third hypothesis can be formulated:

H3 : There is a positive relationship between a company's size and its performance.

Asset structure is measured by asset tangibility (TANG), i.e. the ratio of the fixed assets to the total assets. It refers to a company's investments in tangible assets. If these investments are effective, a company's performance improves. Ghosh (2008) states that the greater the asset tangibility, the lower the scope of the informational asymmetries between the insiders and the outsiders. It allows for a higher leverage, with a concomitant positive effect on profitability. This relationship is U-shaped. It suggests that a greater increase in tangibility exerts a positive effect on the profits. As such, the fourth hypothesis is as follows:

H4 : A company's tangibility is expected to positively impact its performance.

4 Description of the Dataset and Methodology

The object of analysis are the companies continuously listed on the main market of the Warsaw Stock Exchange during the period of 2000–2015. There were 117 companies, including 6 from the WIG-20, 17 on the WIG-40, 22 from the WIG-80 and 72 not present in any of them. The WIG-20 index is based on the value of portfolio, with shares in the 20 major and most liquid companies on the Main Market of the WSE. The WIG-40 comprises 40 medium size companies listed on the Main Market of the WSE. The WIG-80 index comprises 80 smaller companies listed on the Main Market of the WSE. Out of the above indicated companies, only companies from the non-financial sector were included in this study. Companies from the financial sector were excluded, due to the specificity of their activities significantly differing from production, construction, service, etc. For this reason, financial statements of these companies are different in form and so, they are not comparable with the reports of non-financial companies. Therefore, 16 companies were excluded from the sample. Additionally, companies that did not submit complete financial statements were also rejected, i.e. 11 companies. Finally, 90 companies were qualified for the study, i.e. 77 % of the pre-selected sample. The data constitutes a balanced panel of 90 units in 15 periods. By the "balanced panel" we understand a panel with full sets of data, i.e. that all information for every company is available. In our case, we selected the companies that were continuously traded on the Warsaw Stock Exchange during the years 2000 to 2015, so there are no missing values in the time series.

With regard to the papers mentioned in Table 1 as well as in order to verify the hypotheses, a dynamic panel data linear model is proposed:

$$y_{i,t} = \beta_0 + \beta_1 y_{i,t-1} + \sum_{j=1}^{4} \alpha_j x_{ji,t} + \zeta_{i,t} \tag{1}$$

where $y_{i,t}$ is the explained variable, represented by the value of Tobin's Q ratio or the MBVR for ith company in time t; $y_{i,t-1}$ is the lagged value of $y_{i,t}$; explanatory variables $x_{ji,t}$ represent the factors affecting corporate performance, in particular: LEVERAGE, GROWTH, SIZE, and TANG (described above); $\beta_0, \beta_1, \alpha_1, ..., \alpha_4$ are the structural parameters, and $\zeta_{i,t}$ is the error term. Such explanatory variables were pre-selected from those proposed in the literature, based on data-mining and the correlations among them. The entire data set is represented by yearly time series.

In the first step of the empirical analysis, the stationarity of the panel series have been tested. If the series are stationary, then they can be used directly in the model. The dynamic panel data statistical model, given by Equation (1), will be estimated using the pooled OLS method with robust standard errors (Arellano, 1987). Then, the fixed effect models and random effect models will be estimated. In order to select the best version of the model, three tests will be applied. The null hypothesis of the joint significance test assumes that the pooled model should be selected. The alternative hypothesis suggests to select the fixed effects model. The second one, the Lagrange multiplier test by Breusch-Pagan, in the null hypothesis assumes that the pooled model should be selected. The alternative hypothesis suggests to select the random effects model. The last test, the Hausman test, allows to test whether the random effects model is consistent (= null hypothesis) or the fixed effects model is more adequate (= alternative hypothesis). In the next step, we allowed to the U-shaped relationship between the market performance and the tangibility, by introducing the squared value of tangibility into the model. All calculations and estimations have been processed using the Gretl package.

5 Empirical Results

In the first step of the empirical analysis, descriptive statistics are presented. It can be noticed that distribution of all the variables analyzed is characterized by skewness and exhibited excess kurtosis. This applies to both the dependent and the explanatory variables further used in the models.

Table 2: Descriptive statistics of the variables.

Test	Statistics					
	Mean	Median	Std. Dev.	C. V.	Skewness	Ex Kurtosis
Tobin's Q	3.7045	1.1411	41.1350	11.1040	36.3670	1356.00
MBVR	4.6626	1.1785	32.5980	6.9913	19.6570	590.28
LEVERAGE	1.5166	0.4068	39.7640	26.2190	37.8980	1434.50
GROWTH	0.0000	0.0372	0.0000	37.6650	37.9060	1434.90
SIZE	0.3648	0.0371	9.6466	26.4460	37.7760	1428.30
TANG	0.2669	0.2532	0.2010	0.7530	0.5422	−0.4743

In the next stage, the stationarity of the two series being modelled was tested. Five tests were used for the panel data. The null hypothesis assumes that the series is the I(1) process, while the alternative one assumes that it is stationary. Empirical probabilities were close to 0.000 in the all cases. All of the statistics suggest rejection of the null hypotheses (Table 3). If a level of significance equal to 0.05 is assumed for the analysis, consequently, both series can be treated as stationary. The remaining variables also turned out to be stationary, assuming the significance level of 0.05.

Table 3: Stationarity tests of the variables.

Test	Statistics					
	Tobin's Q	MBVR	LEVERAGE	GROWTH	SIZE	TANG
Im−Pesaran−Shin	-2.8148^{***}	-3.1568^{***}	-1.6561^{*}	-3.5382^{***}	-3.7548^{***}	-1.6624^{*}
Choi Meta−Tests:						
Inverse Chi−Square	374.998^{***}	392.689^{***}	190.7440	703.510^{***}	720.5510^{***}	194.3380
Inverse Normal Test	-7.9156^{***}	-9.2377^{***}	-1.4226^{*}	-18.1754^{***}	-18.3323^{***}	-1.4499^{*}
Logit Test	-8.3091^{***}	-9.3189^{***}	-1.4386^{*}	-19.8611^{***}	-20.5285^{***}	-1.4959^{*}
Levin−Lin−Chu Pooled ADF	-6.2170^{***}	-26.6580^{***}	-0.1100^{*}	-1.0716^{***}	-1.0597^{***}	-0.2322^{***}

*, *** Statistically significant at the level of 0.1 and 0.01 respectively.

Then, correlation between the variables was tested. The 5 % critical value (two-tailed) is 0.0517. Assuming, as above, the level of significance at 0.05, only two correlations were statistically significant. The correlation between the value of the Tobin's Q series and the LEVERAGE, which indicates a positive relationship between the measure of market performance, represented by the Tobin's Q ratio, and the ratio of the total debt to the total assets (Table 4). The second correlation is between the Tobin's Q and the MBVR.

Next, the dynamic panel data models were estimated. For comparison purposes, estimations of the static versions of the models were presented. The results are provided in Table 5. Using the diagnostic tests applied in the analysis (the joint significance test, the Breusch-Pagan test and the Hausman test), the best models were selected. It can be noticed that when the Tobin's Q – the market performance measure – was modelled, then the lagged value of this measure as well as the level of the leverage were statistically significant. It

confirms the advantage of the dynamic version of the model over the static one. The results show that, if the value of Tobin's Q in the previous year increased by one unit, it results in an increase of its value in the present period, on average by 0.47 units, ceteris paribus. Also, an increase in the LEVERAGE by one unit, leads to an increase of Tobin's Q, on average by 1.02 units. With regard to the models selected by the diagnostic tests, in the case of the dynamic models, the fixed effects model was the best, while in the case of the static ones, the random effects model was the best.

Table 4: Correlation coefficients of the indicators, 2000–2015.

	Tobin's Q	MBVR	LEVERAGE	GROWTH	SIZE	TANG
Tobin's Q	1	0.0530**	0.9859***	−0.0019	−0.0049	−0.0358
MBVR		1	−0.0035	−0.0032	−0.0019	−0.0014
LEVERAGE			1	−0.0010	−0.0041	−0.0360
GROWTH				1	−0.0008	0.0506*
SIZE					1	−0.0399
TANG						1

*, **, *** Statistically significant at the level of 0.1, 0.05, and 0.01 respectively.

Table 5: Estimates of the Tobin's Q and the MBVR as well as statistics of the tests for all the companies listed on the WSE in 2000–2015.

Variable	Models of Tobin's Q		Models of MBVR	
	Fixed Effects	Random Effects	Fixed Effects	Random Effects
Constant	0.5984	1.9755***	4.4917	4.7364***
Tobin's Q(−1)	0.4698***			
MBVR(−1)			−0.0368	
LEVERAGE	1.0208***	1.0209***	0.0000	−0.0030
GROWTH	−0.0000	−0.0000	−0.0000	−0.0000
SIZE	−0.0180***	−0.0003	−0.0092**	−0.0066
TANG	1.2879	0.6792	1.5545	−0.2402
Joint Significance Test	1.2266 #	4.9818 #	1.3882 #	1.4710 #
Breusch-Pagan Test	0.1568	419.541 #	2.3015	8.3875 #
Hausman Test	101.449 #	0.9744	131.639 #	0.2478

, * Statistically significant at the level of 0.05 and 0.01 respectively

The null hypothesis of the particular test is rejected at the 0.05 significance level

The high value of Tobin's Q reflects a company's high market valuation. A value of the index above 1 means that the company's capital is valued by the market above its book value. It means that a high market performance is perceived as a positive signal for creditors. This is the reason why capital structure affects its performance positively. Such a relationship is in line with the trade-off theory.

A high performance in the previous year constitutes a basis for good results in the following year. In other words, a company achieving high revenues has better growth opportunities. This is why market valuation of such a firm is higher in the following year, which is reflected by high market performance measures.

In order to see whether the value of the market performance measure depends on the same factors, with regard to companies differing in size, the entire sample was divided into subsamples. The first subsample (only 4 companies), called "large companies", contains a group of the companies included in the market index of the twenty largest companies listed on the WSE, particularly in the WIG-20 index. The second subsample is composed of 14 medium size companies included in the WIG-40 index. The next subsample contains 21 small companies from the WIG-80 index. The last group of 51 companies constitutes a subsample called "the remaining companies". It is worth to remember that this group covers the large-, the medium- and the small-sized companies. It needs to be emphasized that it is a very varied subsample. The results of the estimates of the panel dynamic models describing the market performance measured by Tobin's Q ratio, for each subsample, are provided in Table 6. It can be seen that in each case the pooled model seemed to be more appropriate (the joint significance test and the Breusch-Pagan test). In each model, the lagged value of Tobin's Q was statistically significant, positively influencing the value of its measure in the present time. It is interesting that, if the subsample of the remaining companies is taken into account, the LEVERAGE positively influences the market performance. This is in line with the static trade-off theory. In turn, the structural parameter, being close to the company size, is negative and statistically significant, which is a surprising result. The reason for this may be the fact that these companies have some components within the structure of the assets, which, in a short-term perspective, do not bring any additional revenues, e.g. some long-term investments or stocks of raw materials and supplies constituting a collateral, in the event of a sudden increase in the demand or in the prices of the supplies and raw materials. Companies with a high share of such assets in the total assets may exhibit low profitability, because

a high level of non-production assets creates additional costs, which, in turn, reduces profits. The negative relationship between the company's size and its profitability is in line with the pecking order theory.

Table 6: Estimates of Tobin's Q model and statistics of the tests for the groups of the companies listed on the WSE in 2000–2015.

Variable	Large Companies	Medium Companies	Small Companies	Remaining Companies
	Pooled	Pooled	Pooled	Pooled
Constant	0.7822***	5.8675	1.3500*	−0.0214
Tobin's Q(−1)	0.3591***	0.4738***	0.5827***	0.7350***
LEVERAGE	0.2926	−4.0107	−0.5856	1.0193***
GROWTH	−0.1507	−0.0061	−0.0818	0.0000
SIZE	−0.0516	0.0115	0.4970	−0.0275***
TANG	−0.2876	−4.8012	0.2572	0.1613
Joint Significance Test	0.6131	1.2284	1.1219	0.040
Breusch-Pagan Test	1.0558	0.0661	0.5099	3.6388

*, *** Statistically significant at the level of 0.1 and 0.01 respectively

Table 7: Estimates of the MBVR model and statistics of the tests for the groups of the companies listed on the WSE in 2000–2015.

Variable	Large Companies	Medium Companies	Small Companies	Remaining Companies
	Pooled	Pooled	Pooled	Fixed effects
Constant	0.5786*	5.1709	−2.2919	1.3171
MBVR(−1)	0.4569***	0.6319***	−0.0314	−0.0053
LEVERAGE	1.1405	0.0635	21.167 *	0.0001
GROWTH	−0.1467	−0.0033	−0.4413	−0.0000
SIZE	−0.1364	−0.7583	7.7265	5.7219
TANG	−0.7661	−6.0129	−1.7679	−0.0140
Joint Significance Test	0.9769	1.0144	0.9884	1.8163 #
Breusch-Pagan Test	0.8444	0.7549	0.2415	6.3984 #
Hausman Test	na	12.1444 #	21.511 #	97.3674 #

*, *** Statistically significant at the level of 0.1 and 0.01 respectively

The null hypothesis of the particular test is rejected at the 0.05 significance level

Furthermore, the market performance measured by the MBVR was modelled with respect to each subsample. The results are presented in Table 7. In nearly all cases, the best model selected, based on the joint significance test, the Breusch-Pagan test, and the Hausman test, was the pooled model. Unfortunately, only for the large-sized companies and for the medium-sized ones the statistical significance of the lagged variable was found. The positive value of the structural parameter estimated suggests that the current-year value of the MBVR results from an increase in the value of this variable in the previous year.

Table 8: Estimates of the Tobin's Q and the MBVR without the leverage as well as statistics of the tests for all the companies listed on the WSE in 2000–2015.

Variable	Models of Tobin's Q				Models of MBVR			
	Pooled	Pooled	Pooled	Pooled	Fixed Effects	Random Effects	Fixed Effects	Random Effects
Constant	4.0557**	5.6804***	2.8543*	4.5072***	4.4919*	4.7191***	5.1071***	5.0005***
Tobin's Q(−1)	0.6525***		0.6529***					
MBVR(−1)				−0.0368		−0.0367		
GROWTH	0.0000	−0.0000	0.0000	−0.0000	−0.0000	−0.0000	−0.0000	−0.0000
SIZE	−0.0486	−0.0256	−0.0450	−0.0221	−0.0092	−0.0069	−0.0096	−0.0076
TANG	−7.4628	−7.3671			1.5541	−0.1938		
TANG^2			−7.0146	−7.1139			−1.8535	−2.9867
Joint Significance Test	0.9882	1.0836	0.9985	1.0946	1.3894 #	1.4723 #	1.3872 #	1.4709 #
Breusch-Pagan Test	0.3309	0.2109	0.0146	0.2772	2.3078	8.4034 #	2.2785	8.3562 #
Hausman Test	2.0849	0.4439	2.1917	0.4671	131.656 #	0.0486	131.445 #	0.0343

*, **, *** Statistically significant at the level of 0.1, 0.05 and 0.01 respectively

The null hypothesis of the particular test is rejected at the 0.05 significance level

As it has been indicated above, the value of the LEVERAGE is highly positively correlated with Tobin's Q ratio. It is mainly due to the construction of both measures. To avoid high collinearity, the LEVERAGE variable was omitted. As already mentioned, according to the theory, the relationship between market performance and tangibility is U-shaped. To include such a relationship in the

model, a squared value of tangibility was created (TANG^2). Estimation of a model with the variables TANG, TANG^2 considered jointly and separately, was proposed, in order to select the model that best describes the dependent variable's evolution. The results of the estimations are presented in Table 8. Again, the best models were selected based on three diagnostic tests (the joint significance test, the Breusch-Pagan test, and the Hausman test), which are presented in the table. It can be noticed that this modification does not change the conclusions regarding the significance of the relationships between the variables. Only the lagged exogenous variables were statistically significant at the significance level of 0.05. It confirms the advantage of the dynamic model over the static one.

6 Conclusions

On the basis of the empirical analysis, in the case of market performance, only the first hypothesis stated in the paper can be confirmed. When Tobin's Q was modelled, the level of the LEVERAGE proved to be significant. It means that a company's capital structure affects its performance. The sign between both variables, LEVERAGE and Tobin's Q, is positive, which is in line with the trade-off theory. It means that a company's high market performance is perceived as a positive signal for creditors.

The dynamic panel data modelling allowed the conclusion that, irrespective of the measure selected (Tobin's Q or the MBVR), the value of this measure is positively dependent on its value in the previous year. It means that high performance in the previous year constitutes a basis for good results in the following year. In other words, a company that achieves high revenues has better growth opportunities. This explains why the market valuation of such a firm is higher in the following year, as reflected by the high market performance measures. The remaining hypotheses, i.e.

H2 : *growth opportunities are expected to increase a company's performance*,

H3 : *there is a positive relationship between a company's size and its performance* and

H4 : *a company's tangibility is expected to positively impact its performance*

need to be rejected. When subsamples of companies were analysed, pooled models were selected. It means that the companies did not differ specifically in terms of the level of Tobin's Q and MBVR. Generally, it was not possible to find significant explanatory variables in the models, except for the lagged variables (a company's capital structure, growth opportunities, size of the company and a company's tangibility were statistically insignificant). Only Tobin's Q model for the subsample of the remaining companies showed two significant elements – leverage and company size. The negative relationship between these variables is a surprising result. The reason for this may be the fact that large companies demand larger loans and larger payables, which are harder to obtain.

It should be remembered, that the study only involved selected variables and the research only covered listed companies, due to the availability of statistical data. Therefore, the results of the study cannot be generalized to other enterprises.

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