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The Determinants of Capital Structure Choice: Evidence from Polish Companies

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Abstract The main objective of this paper is to investigate which of the two competing capital structure theories – the pecking order of financing choices or the traditional static trade-off model – better describes the financing decisions in Polish companies traded on the Warsaw Stock Exchange (WSE). The data come from financial statements of the companies and cover a 5-year period, 2000–2004. First, a correlation is run in order to separate a set of significant factors influencing the capital structure from the list of the following independent variables: assets structure, profitability, growth opportunities, liquidity, firm size, product uniqueness, earnings volatility, non-debt tax shields, dividend policy, and the effective tax rate. Next, in order to test the relationship between capital structure and its potential determinants, multiple regression is run. The evidence generally suggests the relevance of the pecking order hypothesis in explaining the financing choices of Polish firms.

Keywords Capital structure · Static trade-off · Pecking order · Financing choices

JEL Classification G32

Introduction

The problem of capital structure choice has been heavily discussed by international researchers for the last few decades. Scientific work aiming at finding an answer to the questions:

- What is the influence of capital structure on firm value?
- How do firms choose their capital structures?
- What are the determinants of capital structure choice?

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can be generally grouped into two schools of thought. The first one is the traditional "static trade-off" theory, which derives form the Modigliani and Miller's (1963) hypothesis of capital structure irrelevance and suggests that firms choose their optimal capital structures by trading off the benefits and costs of debt and equity. The main benefit of debt is tax deductibility of interest, which is balanced against bankruptcy costs (Kim 1978; Kraus and Litzenberger 1973) and agency costs (Jensen and Meckling 1976; Myers 1977). It suggests the existence of a target optimal capital structure, which companies try to reach.

Contrary to the above is the "pecking order" theory, which assumes that there is no target level of leverage, and companies use debt only when their internal funds are insufficient. It was first observed by Donaldson (1961) that firms, instead of aiming towards a target-specific capital structure, choose a type of capital according to the following preference order: internal finance, debt, equity. Donaldson's observation was further explained by Myers (1984) and Myers and Majluf (1984) by referring to the existence of information asymmetry between managers (insiders) and investors (outsiders). Insiders, knowing more about the value of the firm than outsiders, avoid issuing equity when the shares of the company are undervalued. Being aware of the above fact, outsiders tend to interpret a share issue as conveying unfavourable information as to the value of the firm. As a result, managers are reluctant to raise equity capital because it is typically followed by a decrease in valuation of the company's assets. Therefore, retained earnings are the most preferred sources of funds and, if external financing is needed, a firm first seeks low-risk debt. According to the pecking order theory, external equity financing is used as a last resort.

Extensive empirical research was carried out worldwide in order to find evidence in support of the above theories. Yet, the results still remain ambiguous. Taggart (1977) proved that companies tend to keep to a target debt ratio. The evidence in support of the trade-off theory is also found in Bradley et al. (1984) synthesis of earlier theoretical and empirical literature on optimal capital structure. On the other hand, Titman and Wessels (1988), as well as Rajan and Zingales (1995), whose works are referred to as the most important empirical studies in the field, find strong negative relationships between debt ratios and profitability. This evidence is consistent with the pecking order behaviour and inconsistent with the trade-off theory. One of the latest papers in support of the pecking order theory is by Shyam-Sunder and Myers (1999), who explicitly compare it with the static trade-off theory using a panel of US firms. They conclude that, compared to the static trade-off model, the pecking order theory explains more of the variation in actual debt ratios. Even if companies in their sample had well-defined optimal debt ratios, their managers were not trying to obtain them. A support of the model's prediction that leverage ratios fall with increase in profitability and availability of internal funds is also found by Baskin (1989) and Chaplinsky and Niehaus (1993). But the results of Helwege and Liang (1996) are inconsistent with the pecking order behaviour in that the probability of obtaining external funds is unrelated to the shortfall in internally generated funds. Gaud et al. (2005) find evidence for both theories. The results of Haan and Hinloopen (2003) also indicate that both, the static trade-off and the pecking order theory, are of empirical importance in explaining financing choices of their sample companies, although not all aspects of the theories are confirmed.

It is not the author's intent to review all existing research in the field. However, it should be pointed out that with a few exceptions, the studies concern mainly developed countries, and the findings concerning capital structure choice in developed countries may not be applicable in Poland. Although the knowledge on various capital structure theories is quite satisfactory in Poland,[1] attempts of empirical verification of the above theories have still been rather scarce. Existing empirical research includes:

- Skowroński (2002, pp. 59–73), who simply compared correlation coefficients between four selected factors and capital structure measured in relation of total debt to total assets. Generally, he interprets his results as strongly supportive of the pecking order theory, as the relation between profitability and debt was negative.
- Campbell and Jerzemowska (2001, pp. 51–76), using a standard regression procedure, measure the influence of size, profitability, growth opportunities, non-debt tax shields, and assets structure on long term debt to assets ratio. Their results showed the preference for internally generated funds, which supported the pecking order hypothesis as well.
- Gajdka (2002, pp. 293–315), who used a similar method, also found support of the pecking order theory, shown by the negative significant influence of profitability on the level of debt.

Additionally, there are two papers – by Hussain and Nivorozhkin (1997) and Nivorozhkin (2004) – which compare Poland to other developing or EU accession countries. Their results for Poland were generally in line with the previously described, with the major emphasis on profitability and age.

While all of the prior empirical research on capital structure decisions in Poland generally leads to univocal results, it has at least two drawbacks. First, most of the studies used a relatively small number of explanatory variables and omitted such important factors – from the theoretical point of view – as liquidity, growth opportunities, business risk, or taxes. Secondly, the first four studies used relatively old data, i.e., covering first years after transition: 1991–1997. Only the last study included data from 1997 to 2001.

The aim of this paper is to analyze the determinants of capital structure of Polish companies more than a decade after Poland's transition to market economy. The study adds to relatively limited empirical literature on factors influencing capital structure decisions in Poland by introducing an updated data set for the period 2000–2004 and a more extensive set of explanatory variables. The analysis is conducted using multiple regression method. First, the model for the total sample is estimated. Then, a more in-depth analysis is carried out by dividing the companies into several classes according to size, profitability, and dividend policy. The results generally suggest the relevance of the pecking order theory in explaining the financing choices of Polish listed companies. However, not all of the predicted variables were discovered to be significant.

[1] Two extensive overviews of capital structure theories in Polish include: Gajdka (2002) and Jerzemowska (1999).

The rest of the paper is organized in the following way. First, the macroeconomic environment of Polish companies is briefly outlined. It is followed by a discussion of attributes of factors that are identified by various theories as the determinants of a firm's capital structure choice, with special emphasis on the factors resulting from the two competing theories: pecking order and static trade-off. Then, the data set and methodology are explained and the sample is described. The next two sections present results of regression analysis of the whole sample and of different classes of firms. The last section constitutes a summary and conclusion.

Macroeconomic Environment

After the recession period of 2001–2002, when the growth rate of GDP in Poland was down to 1%, signs of economic recovery have been visible since 2003 (see Table 1). In 2004 Poland achieved a growth rate of 5.4%, which was the highest since 1997. In the first two quarters of the year, the growth was mainly driven by Polish accession to the European Union, which additionally increased confidence of foreign investors.

The rate of inflation was gradually falling from 10.1% in 2000 to 0.8% in 2003. However, the expectations of price increases connected with EU accession drove it up to the level of 3.5% in 2004.

The stagnation in years 2001–2002 was also visible in financial market. Under the positive influence of macroeconomic recovery and improved results of Polish companies, however, the performance of financial market has improved recently. The fastest growth concerned the capital market. After the downturn of 2001–2003, in 2004, capitalization of the domestic companies on the Warsaw Stock Exchange (WSE) rose by 53%, compared to the previous year, reaching the level of PLN 291.7 billion. This made the WSE one of the most dynamically growing exchanges in Europe, approaching levels of market capitalization of Austrian, Irish, Greek, or Norwegian exchanges. By the end of 2004, the number of listed companies in Poland increased to 230.

Polish corporate bond market is still of marginal importance. It is mainly the result of too many legal regulations that were imposed on bond issuers. Although liberalization of the law in 2000 increased opportunities of bond financing by Polish companies, they are still reluctant to use this source of financing, which may result

Table 1 Poland: Macroeconomic indicators

Indicators	2000	2001	2002	2003	2004
GDP growth rate	4.0%	1.0%	1.4%	3.8%	5.4%
Inflation	10.1%	5.5%	1.9%	0.8%	3.5%
Stock market capitalization (PLN billion)	130.1	103.1	110.56	167.7	291.7
Stock market capitalization (% of GDP)	18.2%	13.8%	14.3%	20.6%	33.0%
No. of companies listed	225	230	216	203	230
Corporate bond market value (% of GDP)	0.8%	0.6%	0.6%	0.3%	0.3%
CIT	30.0%	28.0%	28.0%	27.0%	19.0%

Sources: Central Statistical Office 2004; Warsaw Stock Exchange 2001, 2002, 2003, 2004, 2005; Fitch Polska S.A. 2001, 2002, 2003, 2004

from the fact that potential issuers are underinformed. Moreover, the companies in good financial health may receive more attractive credit offers from banks. On the other hand, existing bond issuers express satisfaction with this form of financing and declare continuation in the future.

Although the development of the WSE could indicate that Poland is aiming towards a market-based financial system, the data obtained from the Polish National Bank prove that bank credit is the second most important form of investment financing in Poland. Bank credits account for about 30% of investment financing in Polish companies and remain the main external source of financing. Yet, the demand for bank credits was low last year. It was mainly due to an increase in interest rates of corporate credits from 7.1% at the beginning of 2004 to 8.3% in December that year, and also good performance of Polish companies (reliance on internal funds). Moreover, instead of taking bank credits, the companies prefer short-term financing, mainly in the form of trade credits.

In order to boost economic growth, the rate of corporate income tax was reduced from 27% in 2003 to 19% in 2004. To conclude, in spite of the dominance of bank credit over capital market financing in Poland, the recent dynamic development of the latter, as well as decreasing corporate tax rates and high rate of economic growth, may favour the behaviour of Polish companies according to predictions of the pecking order theory.

Theoretical Determinants of Capital Structure Choice

A variety of variables that are potentially responsible for determining capital structure decisions in companies can be found in the literature. In this study, the selection of explanatory variables is based on the alternative capital structure theories and previous empirical work. The choice was sometimes limited, however, because of lack of relevant data. As a result, the final set of explanatory variables includes ten factors: assets structure, profitability, growth opportunities, liquidity, company size, product uniqueness, business risk, non-debt tax shields, dividend policy, and effective tax rate. The variables, together with theoretical predictions as to the direction of their influence on debt ratio and proxies, are summarized in Table 2.

Assets Structure

Assets structure is commonly suggested as a variable since fixed assets can serve as collateral. Greater collateral may alleviate the agency costs of debt (Jensen and Meckling 1976; Myers 1977). That is why, according to the static trade-off theory, there should be a positive relationship between fixed assets and debt. On the other hand, the pecking order theory predicts that firms holding more tangible assets will be less prone to asymmetric information problems and thus less likely to issue debt. This argument suggests a negative relationship. Results obtained for developed countries (Rajan and Zingales 1995; Titman and Wessels 1988) confirm positive influence of assets structure on debt ratios. Still, Campbell and Jerzemowska (2001, p. 72) found a negative relationship for Polish firms and Nivorozhkin (2004) found

Table 2 Explanatory variables definition and predicted relationship with debt ratio

Theory	Variable	Definition		Predicted Relationship
Static trade-off	Assets structure	ASST	Fixed assets/total assets	+
	Profitability	PROF	Operating profit/net revenues from sales	+
	Growth opportunities	GR_1	Percentage change of total assets	−
		GR_2	Percentage change of net revenues from sales	−
		GR_3	Long term investment/total assets	−
	Liquidity	LIQ	Current assets/short term liabilities	+
	Size	SIZ_1	Net revenues from sales	+
		SIZ_2	Total assets	+
	Uniqueness	UNIQ	Costs of sales/net revenues from sales	−
	Business risk	RISK	Standard deviation of percentage change of operating profits	−
	Non-debt tax shields	NDTS	Depreciation/total assets	−
	Effective tax rate	ETR	Income tax/gross profit	+
Pecking order	Assets structure	ASST	Fixed assets/total assets	−
	Profitability	PROF	Operating profit/net revenues from sales	−
	Growth opportunities	GR_1	Percentage change of total assets	+
		GR_2	Percentage change of net revenues from sales	+
		GR_3	Long term investment/total assets	+
	Liquidity	LIQ	Current assets/short term liabilities	−
	Size	SIZ_1	Net revenues from sales	±
		SIZ_2	Total assets	±
	Business risk	RISK	Standard deviation of percentage change of operating profits	−
	Dividend policy	DIV	Dividend/net profit	+

this variable insignificant. According to Bevan and Danbolt (2002), the relationship between assets structure and debt depends on the measure of debt applied. They found assets structure to be positively correlated with long-term debt and negatively correlated with short-term debt elements. The hypothesis seems reasonable for Poland, where debt is mainly short-term. Assets structure is measured with the ratio of fixed assets over total assets.

Financial Situation

According to the pecking order hypothesis, firms have a preference for internal finance over external finance. Availability of internal funds is captured by the variables *profitability* and *liquidity*. If the pecking order theory holds, these two should be negatively correlated with capital structure. Alternatively, according to the trade-off hypothesis, firms would choose to have high levels of debt in order to obtain attractive tax shields. This would imply a positive relationship between profitability and debt. Jensen (1986) argues that cash-rich firms should acquire new debt to prevent managers from wasting free cash flows, which implies positive relationship for liquidity. The majority of empirical evidence favours the view that profitability and liquidity are negatively correlated with debt ratios (Titman and Wesssels 1988; Friend and Lang 1988; Rajan and Zingales 1995; Campbell and Jerzemowska 2001, p. 69; Bevan and Danbolt 2002; Skowroński 2002, pp. 69–70;

Gajdka 2002, pp. 306–309). In line with other studies, the ratio of operating income to net revenues from sales is used as a proxy for profitability and the current ratio is used to measure liquidity.

Growth Opportunities

Jensen and Meckling (1976), Myers (1977), and Stulz (1990) argued that leverage is inversely related to *growth opportunities* since growing firms have more opportunities to invest in risky projects at the expense of creditors (the cost of debt increases). Alternatively, according to the pecking order approach, high growth firms have greater need for funds and, therefore, can be expected to borrow more. They will especially issue securities less subject to informational asymmetries, i.e. short-term debt. Empirical evidence in support of the negative relationship can be found in Titman and Wesssels (1988), Rajan and Zingales (1995), and Barclay and Smith (1996), while Bevan and Danbolt (2002) found growth opportunities to be positively correlated with total debt. There are three proxies commonly used in literature to measure growth opportunities, which are applied in this study: average growth rate of total assets, average growth rate of revenues from sales, and long-term investment to total assets.

Size of the Firm

Another important potential determinant can be the *size* of the firm. Rajan and Zingales (1995) argued that larger firms tend to be more diversified and, therefore, have lower probability of failure (bankruptcy). Thus, size, as an inverse proxy for the probability of bankruptcy, may be positively correlated with leverage. Ferri and Jones (1979) suggest that large firms have easier access to the market and can borrow at better conditions. The asymmetric information argument of Myers and Majluf (1984) suggests that information asymmetries are smaller in the case of big companies, thus, they would have more incentives to issue equity instead of debt. Most empirical studies report a significant positive correlation between size and debt level (Rajan and Zingales 1995; Barclay and Smith 1996; Lucas et al. 1997; Bevan and Danbolt 2002). Moreover, Bevan and Danbolt (2002) found that the relationship depends on the nature of debt: the correlation should be positive in case of long-term debt and negative in short-term debt. In this study, firm size is measured with two variables: net revenues from sales and total assets.

Product Uniqueness

The static trade-off approach predicts that companies producing unique products should have lower debt ratios because *product uniqueness* is connected with higher bankruptcy costs. Several measures for uniqueness have been suggested in literature. The most appropriate should be research and development (R&D) expenses over sales. However, due to a lack of data on R&D of the studied companies, another measure was used. According to Titman and Wessels (1988), firms with relatively unique products are expected to advertise more and, in general, spend more on promoting and selling their products. Therefore, the measure used here is: selling

expenses over sales. Gajdka (2002, p. 308), using the same measure, found no significant relationship between uniqueness and debt level in Poland.

Business Risk

Business risk is usually reported to be inversely related to debt ratios. The arguments for this can be twofold. First, firms with more variable cash flows, i.e. higher business risk, have higher probability of bankruptcy. Second, potential default risk related to high earnings volatility causes risk-averse managers to avoid excessive debt levels. The pecking order theory predicts that firms with high volatility of financial results try to accumulate cash during good years to avoid underinvestment in the future. The standard deviation, variation and percentage change of operating earnings are the most frequently used measures of business risk. In line with existing literature, the measure of business risk used in this study is the standard deviation of the percentage change of operating earnings.[2]

Tax Shields

According to Modigliani and Miller (1963), companies should aim towards entire debt financing due to tax deductions associated with interest payments on debt. Therefore, in line with the static trade-off theory, a positive relationship between *effective tax rate* and leverage should be expected. The effective tax rate is measured as the ratio of total tax to total taxable income of a firm.

DeAngelo and Masulis (1980) observed that *non-debt tax shields* can serve as a substitute for debt tax shields. Non-debt tax shields include all non-interest tax deductions to be made from firm's taxable income such as depreciation expenses on fixed assets or R&D costs. As a result, non-debt tax shields should be inversely related to debt ratios. The ratio of depreciation to total assets is used as the measure of non-debt tax shields in this study. Negative relationship between non-debt tax shield and debt was confirmed by Gajdka (2002, pp. 306–309), but Campbell and Jerzemowska (2001, p. 71) found it positive.

Dividend Policy

Dividend policy is less commonly included in empirical studies on the determinants of capital structure choice. Martin and Scott (1974), as well as Frank and Goyal (2004), however, found it to be a useful discriminator in their analysis. Dividend payments decrease the amount of internal funds and increase the need for external financing. That is why a positive relationship between payout ratio and debt can be expected. The payout ratio is defined as dividends over net profit.

[2]MacKie-Mason (1990) and Helwege and Liang (1996) suggest additional measure of default risk, mainly Altman's *Z*-score. The author has tried to measure risk with the *Z*-score, but calculated according to the formula suggested by Hołda (2001), which is believed to better fit Polish economic conditions. This factor, however, was strongly correlated with liquidity and finally excluded from further analysis.

Capital Structure Definition

The choice of the measure of corporate *capital structure* (C_STR) may be controversial, as lack of a univocal definition of capital structure led to emergence of a variety of factors used to measure it. Usually, different forms of debt ratio are used. The differences between the measures concern mainly two things. The first one relates to the nature of debt included. Some authors adopt a more inclusive measure of debt that is total debt. Others work only with long-term debt. Short-term measures are applied rarely. Additionally, many authors have reported that results achieved with the narrow and the broad concepts are either very similar or better with the use of the broader concept. According to Bevan and Danbolt (2002), focusing on long-term debt when analyzing firms which incorporate a larger percentage of short-term debt into their structure, will yield limited explanatory power. They argue that inclusion of trade credit has a substantial impact on explanatory variables. Thus, in case of Poland, where short-term liabilities (mainly trade credits) play an important role in corporate financing, application of the broader measure of capital structure is reasonable. Second, authors differ as to the use of either book or market values in their capital structure measures. Market values result from capital structure theory, but in practice, there is a problem with obtaining data on the market value of corporate debt. According to Graham and Harvey (2001), application of book values is reasonable because financial managers use mainly book values in decision making. Some researchers use market and book values of debt ratios at the same time, obtaining similar results for both measures (e.g., MacKay and Philips 2005). In line with the above argumentation, the measure of firm's indebtedness used in this study is total liabilities over total assets, calculated with book values.

Sample and Methodology

Sample Description

The study on capital structure determinants in Polish companies was carried out on a sample of non-financial companies traded on the Warsaw Stock Exchange in years 2000–2004. The data for the study were obtained from balance sheets, income statements and cash-flow statements of the companies included in Notoria Serwis (2005).

The selected sample included, in total, 238 companies belonging to 13 industries. Industries with the biggest numbers of representative companies were: construction (34), wholesale and retail (29), and food (27). Table 3 shows industry breakdown of the sample.

Table 4 shows descriptive statistics for the value of total liabilities to total assets reflecting the capital structure of the analyzed companies. In 2000, debt financing accounted for 48% of total financing of the companies. The value went up in the following years, reaching 56% in 2002 and 2003. In the last year of the analysis, the share of total liabilities in assets went down slightly. The results, compared to the ones reported by Skowroński (2002, p.62), indicate that corporate indebtedness substantially increased in Poland during the last decade. Skowroński reported

Table 3 Sample split according to industry

Industry	Number of Companies	Fraction (%)
Construction	34	14.29
Wholesale and retail	29	12.18
Food	27	11.34
Chemicals	22	9.24
IT	21	8.82
Electroengineering	21	8.82
Light industry	18	7.56
Metal	17	7.14
Building materials	12	5.04
Energy	10	4.20
Other services	10	4.20
Wood and paper	9	3.78
Media	8	3.36
Total	238	100.00

average debt ratios of 33% for the period 1991–1997. The 52% ratio of total liabilities to assets in 2004 indicates a considerable change in corporate attitudes towards debt financing, compared to the first years of transition. Moreover, it should be pointed out that the majority of external debt capital has short-term character (see Table 5). Long-term debt ratio fluctuated around a low level of 7% over the sampling period, whereas the ratio of short-term indebtedness was a lot higher, i.e. 42%. There are still many companies in Poland that do not use long-term debt at all.

To conclude, Polish companies in years 2000–2004 used more debt financing than before. However, their indebtedness remained mainly short-term. The reason for this may be relatively high costs of long-term bank debt and early stages of development of the bond market in Poland.

The Method

In order to determine the set of factors influencing capital structure choice in Polish companies, multiple regression was run, in which the total liabilities to assets ratio served as a dependent variable. The multiple regression model takes the following form:

$$Y_0 = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \ldots + \beta_k X_{ik} + \varepsilon_i,$$

Table 4 Summary statistics of capital structure

Year	Mean	Std. Deviation	Min.	Max.	Percentiles			Skewness	Std. Error of Skewness
					25	50	75		
2000	0.48	0.22	0.00	1.15	0.31	0.48	0.64	0.19	0.18
2001	0.54	0.31	0.05	2.58	0.37	0.51	0.66	2.45	0.18
2002	0.56	0.30	0.09	2.05	0.36	0.53	0.71	1.75	0.17
2003	0.56	0.30	0.08	1.94	0.35	0.54	0.70	1.48	0.17
2004	0.52	0.32	0.04	2.01	0.31	0.47	0.66	1.89	0.17
Total	0.53	0.29	0.00	2.58	0.34	0.51	0.67	1.79	0.08

Capital structure is measured as total liabilities to total assets.

Table 5 Maturity structure of debt in Polish listed companies 2000–2004

Year	Total Liabilities/Total Assets	Short-Term Liabilities/Total Assets	Long-Term Liabilities/Total Assets
2000	0.48	0.42	0.06
2001	0.52	0.46	0.06
2002	0.56	0.41	0.08
2003	0.56	0.42	0.07
2004	0.52	0.38	0.08
Total	0.53	0.42	0.07

where i is the number of observations, k is the number of explanatory variables, β_0 is constant, and β_1 to β_k are regression coefficients.

Using SPSS for Windows 13.0, stepwise selection procedure was chosen. The stepwise procedure is a modified forward selection method, which later in the process permits elimination of variables that become statistically non- significant. The value of the partial F-statistic for a variable to be included in the model was set at the level of PIN=0.01, and the value of the F-statistic for exclusion – POUT=0.1.

Explanatory variables were calculated as described in the previous section. Summary statistics are presented in Table A1 in Appendix.

Regression Results: Total Sample

Explanatory variables to enter the regression procedure were chosen from the primary set of variables described above, using correlation matrix. The finally selected variables to be used in the regression model were only those for which the Pearson correlation coefficients were significantly correlated with the dependent variable (p=0.05[3]). The correlation matrix is presented in Table A2 in the Appendix. At this preliminary stage of the study such variables as growth opportunities, non-debt tax shields, risk, and effective tax rate have already been excluded from further analysis. The results of regression analysis are presented in Table 6.

Generally, the signs of regression coefficients for all of the variables that entered the final model are in line with the predictions of the pecking order theory. The only exception is uniqueness which was not predicted by this theory.

The most important factor in explaining variation in capital structure of Polish firms is *liquidity*. Negative sign of the coefficient for this variable, together with the coefficient for *profitability* in the same direction, suggests that only firms lacking internal funds are using more debt financing. This supports the pecking order theory and is in line with previous studies for Poland and the EU.

The next significant variable entering the final model was product *uniqueness*. This could imply the relevance of the trade-off hypothesis that firms producing unique goods may incur higher bankruptcy costs and thus used to have lower debt ratios. However, the positive sign of the coefficient for this variable contradicts the static trade-off theory. The correlation between the amount of selling expenses and

[3]The only exception was the size variable (SIZ_2) which was included at the significance level of 0.06.

Table 6 Regression results: total

Model		Unstandardized Coefficients		Standardized Coefficients	*T*	Sig.	*R*	R Square	Adjusted *R* Square
		B	Std. Error	Beta					
1.00	(Constant)	0.75	0.01		60.62	0.00	0.58	0.33	0.33
	LIQ	−0.12	0.01	−0.58	−22.00	0.00			
2.00	(Constant)	0.73	0.01		63.51	0.00	0.65	0.42	0.42
	LIQ	−0.12	0.01	−0.55	−22.52	0.00			
	PROF	−0.14	0.01	−0.29	−11.93	0.00			
3.00	(Constant)	0.69	0.02		45.39	0.00	0.66	0.43	0.43
	LIQ	−0.11	0.01	−0.55	−22.60	0.00			
	PROF	−0.14	0.01	−0.29	−12.06	0.00			
	UNIQ	0.09	0.02	0.11	4.62	0.00			
4.00	(Constant)	0.73	0.02		38.36	0.00	0.66	0.44	0.44
	LIQ	−0.12	0.01	−0.56	−22.99	0.00			
	PROF	−0.14	0.01	−0.29	−11.90	0.00			
	UNIQ	0.08	0.02	0.11	4.40	0.00			
	ASST	−0.13	0.03	−0.09	−3.91	0.00			
5.00	(Constant)	0.74	0.02		38.54	0.00	0.67	0.45	0.44
	LIQ	−0.12	0.01	−0.56	−23.14	0.00			
	PROF	−0.14	0.01	−0.29	−11.82	0.00			
	UNIQ	0.08	0.02	0.11	4.42	0.00			
	ASST	−0.13	0.03	−0.09	−3.81	0.00			
	SIZ_2	−0.02	0.01	−0.06	−2.68	0.01			

debt ratio may be explained with the pecking order theory. Mainly, if selling expenses reflect growth opportunities of the company, according to the pecking order, they should be positively correlated with debt levels. Such argumentation may again support the latter theory.

The inverse relation between *assets structure* and capital structure measures proves that higher proportion of fixed assets in total assets of the company will lower asymmetric information problems and result in lower debt ratios. Another argumentation for this negative sign may result form Bevan and Danbolt (2002) hypothesis that assets tangibility is negatively correlated with short-term debt. As the majority of debt in Polish companies is short term, the negative coefficient was expected. At the same time, greater assets denote less asymmetric information problems for Polish firms and thus the sign of the coefficient for the *size* variable is negative.

Although dividend policy was significantly correlated with capital structure (see Table A1), it was not included in the final model. Nonetheless, it should be stressed that the negative correlation coefficient is contrary to theoretical expectations. A possible interpretation of this result is that only companies in good financial health may afford to pay dividends and decide to do so in Poland.[4]

[4]Negative sign was also obtained by Frank and Goyal (2004), who stress the misspecification of the pecking order theory concerning dividend policy.

In order to asses the goodness of fit of the model, an analysis of variance was performed. The results indicate that there is a linear relationship between the debt ratio and the explanatory variables. The value of R^2=0.45 (see Table 6) suggests that 45% of the variation in capital structure in the analyzed companies is explained by the variation of liquidity, profitability, uniqueness, assets structure and size. From the statistical point of view, the achieved value of R square is not high. Yet, in comparison to results obtained by other authors, the model can be recognized as satisfactory. Barclay et al. (1995), using the same method to analyze the influence of six factors on capital structure choice, achieved R^2=0.27. They concluded that their factors explain a significant part of the variation in debt ratios. In the analyses for Poland, Gajdka (2002, p. 307) achieved R^2=0.388 and 0.339, depending on the measure of capital structure, and in the study by Campbell and Jerzemowska (2001, pp. 69–71), it varied from 0.08 to 0.26 depending on the year.[5] Then, in the light of the previous research, the results of this study are regarded as satisfactory.

In order to check the standard assumptions underlying regression analysis, several additional tests were run. The Kolgomorov–Smirnov test assured the normality of the distribution of the residuals. Multicolinearity was excluded on the basis of the values of the condition index that remained below 10.[6] Formal White's test for heteroscedasticity in the random effect framework was performed. The White's test statistic for the model is 151.35 and $\chi^2(964)=854$ for 99.5% confidence level, so heteroscedasticity cannot be confirmed.

Regression Results: Different Classes of Firms

The analysis was further developed by dividing the companies into six sub-samples. Myers (2003, p. 239) argued that different factors might affect various kinds of firms in fundamentally different ways. According to Frank and Goyal (2004), if this is true, then fitting a single model to firms in different situations will generate unstable results due to the aggregation process. Considering this hypothesis, the firms were divided into sub-samples, in accordance to the following criteria:

1. Size:
    - Small firms, if assets are smaller than the 33rd percentile of the whole sample (i.e., SIZ_2<0.05);
    - Large companies, if assets are larger than the 67th percentile of the whole sample (i.e., SIZ_2>0.17);

[5]But the argument to explain it may be that their measure of capital structure was long-term debt to assets.

[6]The value of the condition index from 10 to 30 would indicate the existence of moderate to strong multicolinearity, and severe colinearity is observed when the index exceeds 30.

2. Profitability:
   - Low profit companies, if the profitability ratio is lower than the 33rd percentile of the whole sample (i.e., PROF<.01);
   - High profit firms, if the profitability ratio is higher than the 67th percentile of the whole sample (i.e., PROF>.06);
3. Dividend policy:
   - Dividend payers, if the company paid dividends (DIV>0);
   - Non-dividend-payers, if the company did not pay dividends (DIV=0).

Descriptive statistics for each of the sub-samples are presented in Table A3 in the Appendix. Analysis of each of the distinguished classes of firms proceeded in he same way as of the whole sample. First, basing on Pearson correlation coefficients, variables significantly correlated with capital structure were selected for each of the sub-samples. Then, stepwise regression for each of them was run.

Table 7 Regression results: sample split according to firm size, profitability, and dividend policy

Group	Model	Unstandardized Coefficients		Standardized Coefficients	*T*	Sig.	*R*	R Square	Adjusted *R* Square
		B	Std. Error	Beta					
Small	(Const.)	0.71	0.04		18.94	0.00	0.70	0.49	0.48
	LIQ	−0.13	0.01	−0.53	−12.17	0.00			
	PROF	−0.16	0.02	−0.34	−7.72	0.00			
	UNIQ	0.20	0.05	0.19	4.34	0.00			
Big	(Const.)	0.75	0.02		40.75	0.00	0.69	0.47	0.47
	LIQ	−0.08	0.01	−0.48	−11.10	0.00			
	ASST	−0.30	0.04	−0.31	−7.31	0.00			
	PROF	−0.40	0.11	−0.15	−3.49	0.00			
Low-profit	(Const.)	0.75	0.03		23.18	0.00	0.67	0.45	0.45
	LIQ	−0.14	0.01	−0.50	−11.59	0.00			
	PROF	−0.13	0.02	−0.35	−8.05	0.00			
	UNIQ	0.17	0.04	0.18	4.29	0.00			
High-profit	(Const.)	0.67	0.03		26.40	0.00	0.62	0.39	0.38
	LIQ	−0.08	0.01	−0.57	−12.87	0.00			
	ASST	−0.26	0.05	−0.25	−5.68	0.00			
	PROF.	0.19	0.07	0.12	2.69	0.01			
Dividend-payers	(Const.)	0.65	0.02		32.85	0.00	0.75	0.57	0.56
	LIQ	−0.08	0.01	−0.61	−13.69	0.00			
	ASST	−0.20	0.04	−0.22	−4.83	0.00			
	GR_2	0.13	0.03	0.18	4.11	0.00			
	PROF	−0.45	0.13	−0.16	−3.38	0.00			
Non-dividend-payers	(Const.)	0.70	0.02		38.21	0.00	0.63	0.40	0.40
	LIQ	−0.12	0.01	−0.50	−17.16	0.00			
	PROF	−0.14	0.01	−0.31	−10.74	0.00			
	UNIQ	0.11	0.02	0.14	4.78	0.00			

Regression results for the sub-samples are presented in Table 7. The results generally confirm that there are some differences as to the determinants of capital structure in different classes of firms, however, a lot of similarities were observed.

First, there is a striking similarity between factors significant for non-dividend-paying, small firms, and low profitable firms. Non-dividend-payers are the companies with low profitability ratios. Under this assumption, we can see that the debt ratios of financially constrained firms are more sensitive to liquidity, profitability, and product uniqueness. The results for dividend-paying firms fully support the pecking order theory. They confirm the theory's predictions in terms of availability of internal funds, i.e., liquidity and profitability (descriptive statistics for these firms show they are profitable), as well as in terms of asymmetric information problems (assets structure and growth opportunities).

Interesting results were obtained for highly profitable firms, which debt ratios decrease with increases in liquidity and assets structure variables and, surprisingly, decreases in profitability. This is the only case where the sign of profitability is in line with the static trade-off and not the pecking order theory. It confirms the hypothesis that bankruptcy risk is lower in case of highly profitable firms and thus they will be more willing to accept the financial risk connected with debt financing (Lucas et al. 1997). The leverage of big companies is negatively influenced by liquidity and profitability, and also assets structure.

Although the results generally support the pecking order predictions, neither the risk variable nor dividend policy were included in any of the results for the sub-samples. It seems that these variables do not play an important role in capital structure decisions in Polish companies.

The values of R square vary from 39% for high-profit firms to 57% for dividend payers, which basing on previous argumentation, can be regarded satisfactory. The results of tests checking the assumptions underlying the regression models gave similar results for the total sample and they are not reported here.

Conclusions

This study examines the determinants of financing decisions for 238 Polish non-financial companies that are quoted on the WSE for the 5-year period of 2000–2004. In general, the data suggest that Polish companies have been more willing to use external financing at the beginning of the 21st century, than in the first years of economic transition. Yet, they mainly rely on trade credits, keeping their long-term debt ratios below the 8% level.

The results of multiple regression show that more profitable firms and these having high liquidity ratios, prefer to finance their operations with internal funds. This evidence supports the predictions based on the pecking order theory. The negative relation between assets structure and size variables and the debt ratio may result from lower asymmetric information problems in larger companies with greater fixed assets. If growth opportunities are measured with the relation of selling expenses to sales, the positive coefficient for the uniqueness variable will also be in accordance with the pecking order. The relevance of business risk for Polish firms was not confirmed.

Although there are some differences in capital structure determinants between different classes of firms, generally, the preference for internal financing over external financing is visible in each class. Financial decisions of small, low profitable and non-dividend paying firms seem to be driven by the same set of factors. The major violation of the pecking order theory observed for sub-samples concerns a positive relation between profitability and leverage for highly profitable firms.

The signs of coefficients for profitability, liquidity, assets structure, growth opportunities, size and uniqueness, and the insignificance of effective tax rate or non-debt tax shields suggest that the trade-off theory is not applicable for the companies examined.

To conclude, the results of the study seem to confirm the pecking order theory, although the influence of such variables as risk or dividend policy has not been found. At the same time, it calls for further, more developed studies of capital structure determinants in Poland.

Appendix

Table A1 Explanatory variables: descriptive statistics

Variables	Mean	Std. Deviation	Minimum	Maximum	Percentiles			Skewness	Std. Error of Skewness
					25	50	75		
ASST	0.31	0.21	0.00	0.94	0.14	0.29	0.45	0.54	0.08
PROF	−0.03	0.61	−12.90	2.06	−0.01	0.03	0.08	−15.42	0.08
GR_1	5.94	177.51	−0.77	5468.35	−0.07	0.04	0.19	30.80	0.08
GR_2	0.39	7.44	−0.92	215.73	−0.11	0.05	0.19	27.48	0.08
GR_3	0.14	0.18	0.00	0.98	0.00	0.07	0.19	1.75	0.08
LIQ	1.76	1.40	0.02	11.23	0.97	1.33	2.08	2.62	0.08
SIZ_1	0.34	1.29	0.00	25.10	0.04	0.10	0.28	14.47	0.08
SIZ_2	0.28	0.85	0.00	12.54	0.04	0.09	0.23	9.91	0.08
UNIQ	0.52	0.38	0.00	1.82	0.07	0.67	0.84	−0.20	0.08
RISK	3.14	7.29	0.01	77.73	0.61	1.37	2.91	7.09	0.08
NDTS	0.05	0.04	0.00	0.66	0.02	0.04	0.06	5.30	0.08
DIV	0.23	1.33	0.00	36.31	0.00	0.00	0.05	21.56	0.08
ETR	0.22	0.98	−4.88	20.63	0.00	0.20	0.30	14.29	0.08

Table A2 Correlation matrix

	ASST	PROF	GR_1	GR_2	GR_3	LIQ	SIZ_1	SIZ_2	UNIQ	RISK	NDTS	DIV	ETR	C_STR
ASST	1.00	0.05	−0.01	−0.04	−0.39	−0.06	0.01	0.04	−0.06	0.07	0.37	−0.05	0.01	−0.08
(Sig.)	–	0.10	0.75	0.24	0.00	0.05	0.75	0.16	0.06	0.03	0.00	0.16	0.74	0.01
PROF	0.05	1.00	0.00	−0.01	−0.05	0.08	0.03	0.04	0.00	−0.06	−0.05	0.28	0.03	−0.34
(Sig.)	0.10	–	0.98	0.81	0.11	0.01	0.31	0.21	0.93	0.05	0.14	0.00	0.32	0.00
GR_1	−0.01	0.00	1.00	0.06	−0.02	−0.02	0.00	0.00	0.03	0.00	−0.03	0.00	0.00	0.01
(Sig.)	0.75	0.98	–	0.08	0.46	0.58	0.95	1.00	0.31	0.93	0.35	0.93	0.99	0.78
GR_2	−0.04	−0.01	0.06	1.00	−0.01	0.12	−0.01	−0.01	0.06	−0.02	0.09	0.01	−0.01	−0.03
(Sig.)	0.24	0.81	0.08	–	0.86	0.00	0.87	0.77	0.10	0.65	0.01	0.82	0.75	0.38
GR_3	−0.39	−0.05	−0.02	−0.01	1.00	−0.13	0.04	0.14	−0.01	−0.01	−0.23	−0.01	−0.03	0.00
(Sig.)	0.00	0.11	0.46	0.86	–	0.00	0.27	0.00	0.76	0.86	0.00	0.68	0.32	0.95
LIQ	−0.06	0.08	−0.02	0.12	−0.13	1.00	−0.05	−0.03	−0.03	0.01	0.10	0.12	0.04	−0.58
(Sig.)	0.05	0.01	0.58	0.00	0.00	–	0.14	0.29	0.33	0.74	0.00	0.00	0.24	0.00
SIZ_1	0.01	0.03	0.00	−0.01	0.04	−0.05	1.00	0.85	0.01	−0.04	−0.04	0.01	0.00	−0.01
(Sig.)	0.75	0.31	0.95	0.87	0.27	0.14	–	0.00	0.87	0.22	0.20	0.74	0.88	0.64
SIZ_2	0.04	0.04	0.00	−0.01	0.14	−0.03	0.85	1.00	0.00	−0.04	−0.04	0.03	0.00	−0.06
(Sig.)	0.16	0.21	1.00	0.77	0.00	0.29	0.00	–	0.99	0.23	0.21	0.36	0.93	0.06
UNIQ	−0.06	0.00	0.03	0.06	−0.01	−0.03	0.01	0.00	1.00	−0.01	−0.06	0.05	0.00	0.13
(Sig.)	0.06	0.93	0.31	0.10	0.76	0.33	0.87	0.99	–	0.84	0.08	0.09	0.91	0.00
RISK	0.07	−0.06	0.00	−0.02	−0.01	0.01	−0.04	−0.04	−0.01	1.00	−0.03	−0.09	0.00	0.00
(Sig.)	0.03	0.05	0.93	0.65	0.86	0.74	0.22	0.23	0.84	–	0.42	0.01	0.93	0.89
NDTS	0.37	−0.05	−0.03	0.09	−0.23	0.10	−0.04	−0.04	−0.06	−0.03	1.00	−0.15	0.00	−0.05
(Sig.)	0.00	0.14	0.35	0.01	0.00	0.00	0.20	0.21	0.08	0.42	–	0.00	0.95	0.12
DIV	−0.05	0.28	0.00	0.01	−0.01	0.12	0.01	0.03	0.05	−0.09	−0.15	1.00	0.02	−0.22
(Sig.)	0.16	0.00	0.93	0.82	0.68	0.00	0.74	0.36	0.09	0.01	0.00	–	0.47	0.00
ETR	0.01	0.03	0.00	−0.01	−0.03	0.04	0.00	0.00	0.00	0.00	0.00	0.05	1.00	0.01
(Sig.)	0.74	0.32	0.99	0.75	0.32	0.24	0.88	0.93	0.91	0.93	0.95	0.14	–	0.68
C_STR	−0.08	−0.34	0.01	−0.03	0.00	−0.58	−0.01	−0.06	0.13	0.00	−0.05	−0.22	−0.04	1.00
(Sig.)	0.01	0.00	0.78	0.38	0.95	0.00	0.64	0.06	0.00	0.89	0.12	0.00	0.17	–

Table A3 Descriptive statistics: sample split according to firm size, profitability, and dividend policy

	C_STR	ASST	PROF	GR_1	GR_2	GR_3	LIQ	SIZ_1	SIZ_2	UNIQ	RISK	NDTS	DIV	ETR
Small firms														
N	285	285	285	278	257	285	285	285	285	285	281	285	285	285
Mean	0.58	0.33	−0.12	0.06	1.08	0.09	1.83	0.04	0.03	0.52	4.66	0.06	0.13	0.18
Median	0.49	0.31	0.01	−0.01	0.02	0.01	1.30	0.03	0.03	0.67	1.46	0.05	0.00	0.04
Big firms														
N	316	316	316	314	302	316	316	316	316	316	311	316	316	316
Mean	0.50	0.30	0.04	17.68	0.20	0.18	1.84	0.88	0.71	0.55	2.30	0.04	0.25	0.26
Median	0.52	0.27	0.04	0.06	0.08	0.11	1.29	0.44	0.37	0.71	0.94	0.04	0.00	0.22
Low profit firms														
N	304	304	304	301	290	304	304	304	304	304	298	304	304	304
Mean	0.67	0.33	−0.27	18.23	0.87	0.14	1.36	0.16	0.15	0.51	5.30	0.05	0.11	0.09
Median	0.62	0.31	−0.07	−0.08	−0.11	0.04	1.04	0.05	0.05	0.62	2.42	0.04	0.00	0.00
High profit firms														
N	320	320	320	311	288	320	320	320	320	320	309	320	319	319
Mean	0.43	0.33	0.14	0.23	0.13	0.16	2.21	0.28	0.34	0.50	2.13	0.05	0.21	0.22
Median	0.40	0.31	0.11	0.10	0.10	0.07	1.80	0.10	0.12	0.64	0.81	0.04	0.00	0.25
Dividend-paying firms														
N	251	251	251	250	237	251	251	251	251	251	248	251	251	251
Mean	0.39	0.33	0.07	0.19	0.11	0.13	2.29	0.58	0.42	0.48	2.12	0.05	0.87	0.33
Median	0.35	0.32	0.06	0.07	0.07	0.07	1.90	0.14	0.13	0.62	0.97	0.04	0.42	0.27
Non-dividend-paying firms														
N	713	713	713	700	661	713	713	713	713	713	698	713	713	713
Mean	0.59	0.31	−0.06	7.99	0.49	0.14	1.57	0.26	0.23	0.53	3.61	0.05	0.00	0.18
Median	0.55	0.29	0.02	0.02	0.04	0.06	1.22	0.09	0.08	0.68	1.46	0.04	0.00	0.14

References

Barclay, M. J., & Smith, C. W. (1996). On financial architecture: leverage, maturity and priority. *Journal of Applied Corporate Finance, 8*(4), 4–17.

Barclay, M. J., Smith, C. W., & Watts, R. L. (1995). The determinants of corporate leverage and dividend policies. *Journal of Applied Corporate Finance, 7*(4), 4–19.

Baskin, J. (1989). An empirical investigation of the pecking order hypothesis. *Financial Management, 18*(1), 26–35.

Bevan, A. A., & Danbolt, J. (2002). Capital structure and its determinants in the United Kingdom – A decompositional analysis. *Applied Financial Economics, 12*(3), 159–170.

Bradley, M., Jarrel, G. A., & Kim, E. H. (1984). On the existence of an optimal capital structure: Theory and evidence. *Journal of Finance, 39*(3), 857–880.

Campbell, K., & Jerzemowska, M. (2001). Capital Structure Decisions Made by Companies in a Transitional Economy. In D. Zarzecki (Ed.). *Financial management, objectives – organisation – tools* (pp. 51–76), Warszawa: Fundacja Rozwoju Rachunkowości w Polsce.

Central Statistical Office (2004). *Statistical Yearbook of Poland*. Warsaw: Central Statistical Office.

Chaplinsky, S., & Niehaus, G. (1993). Do inside ownership and leverage share common determinants? *Quarterly Journal of Business and Economics, 32*(4), 51–65.

De Angelo, H., & Masulis R. W. (1980). Optimal capital structure under corporate and personal taxation. *Journal of Financial Economics, 8*(1), 3–29.

Donaldson, G. (1961). *Corporate debt capacity: A study of corporate debt policy and the determination of corporate debt capacity*. Boston: Graduate School of Business Administration, Harvard University.

Ferri, M., & Jones, W. (1979). Determinants of financial structure: A new methodological approach. *Journal of Finance, 34*(3), 631–644.

Fitch Polska S. A. (2001). *The Polish Non-government Debt Sector*. Warsaw: Fitch Polska S. A.

Fitch Polska S. A. (2002). *The Polish Non-government Debt Sector*. Warsaw: Fitch Polska S. A.

Fitch Polska S. A. (2003). *The Polish Non-government Debt Sector*. Warsaw: Fitch Polska S. A.

Fitch Polska S. A. (2004). *The Polish Non-government Debt Sector*. Warsaw: Fitch Polska S. A.

Frank, M. Z., & Goyal, V. K. (2004). *Capital structure decisions: Which factors are reliably important?*, EFA 2004 Maastricht Meetings Paper No. 2464, Tuck Contemporary Corporate Finance Issues III Conference Paper.

Friend, I., & Lang, L. (1988). An empirical test of the impact of managerial self-interest on corporate capital structure. *Journal of Finance, 43*(2), 271–281.

Gajdka, J. (2002). Teorie struktury kapitału i ich aplikacja w warunkach polskich. 1st ed. Łódź: Wydawnictwo Uniwersytetu Łódzkiego.

Gaud, P., Jani, E., Hoesli, M., & Bender, A. (2005). The capital structure of swiss firms: An empirical analysis using dynamic panel data. *European Financial Management, 11*, 51–69.

Graham, J. R., & Harvey, C. R. (2001). The theory and practice of corporate finance: Evidence from the field. *Journal of Financial Economics, 60*, 187–243.

Haan, L., & Hinloopen, J. (2003). Ordering the preference hierarchies for internal finance, bank loans, bond, and share issues: Evidence from Dutch firms. *Journal of Empirical Finance, 10*(5), 661–681.

Helwege, J., & Liang, N. (1996). Is there a pecking order? Evidence form a panel of IPO firms. *Journal of Financial Economics, 40*, 429–458.

Hołda, A. (2001). Prognozowanie bankructwa jednostki w warunkach gospodarki polskiej z wykorzystaniem funkcji dyskryminacyjnej Z_H. *Rachunkowość, 5*, 306–310.

Hussain, Q., & Nivorozhkin, E. (1997). *The capital structures of listed companies in Poland*. IMF Working Paper, WP/97/175.

Jensen, M. (1986). Agency costs of free cash flow, corporate finance and takeovers. *American Economic Review, 76*, 323–329.

Jensen, M., & Meckling, W. (1976). Theory of the firm managerial behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics, 3*(4), 305–360.

Jerzemowska, M. (1999). Kształtowanie struktury kapitału w spółkach akcyjnych. 1st ed. Warszawa: Wydawnictwo Naukowe PWN.

Kim, E. H. (1978). A mean-variance theory of optimal capital structure and corporate debt capacity. *Journal of Finance, 33*(1), 45–63.

Kraus, A., & Litzenberger, R. A. (1973). State preference model of optimal financial leverage. *Journal of Finance, 28*, 911–922.

Lucas, A., van Dijk, R., & Kloek, T. (1997). *Outlier robust GMM estimation of leverage determinants in linear dynamic panel data model*. Working Paper, Tinbergen Institute, Erasmus University Rotterdam (pp. 1–49).
MacKay, P., & Philips, G. M. (2005). How does industry affect firm financial structure? *Review of Financial Studies, 18*, 1433–1466.
MacKie-Mason, J. K. (1990). Do taxes affect corporate financing decisions? *Journal of Finance, 45*(5), 1471–1493.
Martin, J. D., & Scott, D. F. (1974). A discriminant analysis of the corporate debt–equity decision. *Financial Management, 3*(4), 71–79.
Modigliani, F., & Miller, M. H. (1963). Corporate income taxes and the cost of capital: A correction. *American Economic Review, 53*(3), 433–443.
Myers, S. (1977). Determinants of corporate borrowing. *Journal of Financial Economics, 5*(2), 147–175.
Myers, S. C. (1984). The capital structure puzzle. *Journal of Finance, 34*(3), 575–592.
Myers, S. C. (2003). Financing of corporations. In G. Constantinides, M. Harris, & R. Stulz (Eds.). *Handbook of the economics of finance: corporate finance* (Vol. 1A, pp. 215–253). Amsterdam: Elsevier.
Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics, 13*, 187–221.
Nivorozhkin, E. (2004). *Financing choices of firms in EU accession countries*. Discussion Paper No. 6., BOFIT.
Notoria Serwis (2005). Wyniki finansowe spółek giełdowych. Warszawa: Notoria Serwis, Zeszyt 2.
Rajan, R. G., & Zingales, L. (1995). What do we know about capital structure? Some evidence from international data. *Journal of Finance, 50*(5), 1421–1460.
Shyam-Sunder, L., & Myers, S. C. (1999). Testing static trade-off against pecking order models of capital structure. *Journal of Financial Economics, 51*(2), 219–244.
Skowroński, A. (2002). Czynniki kształtujące strukturę kapitału polskich przedsiębiorstw w świetle badań empirycznych. In J. Sobiech (Ed.). Kapitałowa strategia przedsiębiorstw (pp. 13–73). Poznań: Wydawnictwo Akademii Ekonomicznej.
Stulz, R. (1990). Managerial discretion and optimal financing policies. *Journal of Financial Economics, 26*, 3–27.
Taggart, R. A. (1977). A model of corporate financing decisions. *Journal of Finance, 32*(5), 1467–1484.
Titman, S., & Wessels, R. (1988). The determinants of capital structure choice. *Journal of Finance, 43*(1), 1–19.
Warsaw Stock Exchange (2001). Annual Report 2001. Warsaw: Warsaw Stock Exchange.
Warsaw Stock Exchange (2002). Annual Report 2002. Warsaw: Warsaw Stock Exchange.
Warsaw Stock Exchange (2003). Annual Report 2003. Warsaw: Warsaw Stock Exchange.
Warsaw Stock Exchange (2004). Annual Report 2004. Warsaw: Warsaw Stock Exchange.
Warsaw Stock Exchange (2005). Annual Report 2005. Warsaw: Warsaw Stock Exchange.