INFORMATIVE VALUE OF FIRM CAPITAL STRUCTURE

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Abstract:

In this paper, the informative value of firm capital structure is analyzed. In the first part, a theoretical background regarding capital structure theories is presented. In the second (empirical) part, the Ohlson (1995) valuation framework is used in order to analyze the informative value of firm capital structure on a sample of data for the Czech (non-financial) companies. A contextual approach is adopted and the value relevance of debt is analyzed considering the signalling and the optimal capital structure theories. According to the results and in accordance with the optimal capital structure theory, debt is more penalized in case of the companies that deviate from the target debt level. Moreover, debt proves to be a positive signal for the firms with a higher earnings growth potential. This, in turn, is consistent with the signalling theory.

Keywords: conditional capital structure theories, Ohlson valuation model, optimal capital structure theory, signalling theory

JEL Classification: G10, G32

1. Introduction

The objective of the firm is to maximize its current market value, that is to maximize shareholder's wealth.[1] Firms create wealth by making successful investment decisions which generate positive cash flows. The capital structure (financial) decisions determine the balance of debt and equity in the firm. Investment decisions are more important than financial decisions, but it is still necessary to make sensible financial decisions. Thus, if corporate managers can maximize the market value of

the firm by manipulating the debt-to-equity ratio, then they should do so.[2] The optimal capital structure policy, if there is one, is the policy which maximizes shareholder's wealth.[3]

So far, at least to the extent of authors' knowledge, no study has been prepared considering possible valuation implications of the Czech firms' capital structure. What is more, the subject itself has received only a weak attention from the Czech writers until now. Certainly, many reasons could be taken responsible for the fact that, at least on the aggregate level, this question has been widely regarded as "laying beside the point".[4]

In this paper, the informative value of firm capital structure is analyzed. Book value of equity is decomposed in its two main components, total assets and liabilities, in order to test whether investors price them equally. Thus the first hypothesis is defined as follows:

H_0^1: Total assets and liabilities are equally valued by the market.

Then a contextual approach is adopted to examine the value relevance of debt. Two dummy variables are defined to analyze the pertinence of the optimal capital structure theory and the signalling theory. Consequently, following hypotheses are formulated:

H_0^2: The value of debt does not depend on the closeness of firm leverage level to its optimal level.

H_0^3: The value of debt does not depend on the future expected earnings growth of the firm.

To explore the mutual effects of both theories, the last hypothesis is expressed as follows:

H_0^4: The value of debt depends neither on the closeness of the leverage level of the company with respect to the optimal level nor on the future expected earnings growth of the firm.

The structure of the paper is ensuing: in Chapter 2, the most prominent conditional capital structure theories are summarized (mainly the optimal capital structure theory and the signalling theory). Chapter 3 is the empirical part of the paper. The Ohlson (1995) valuation framework is used in similar way as it is used by Giner and Reverte (2001) in order to analyze the informative value of firm capital structure. The hypotheses are defined and econometric models to test the hypotheses are formulated. The estimation of the models is based on a sample of data for the Czech (non-financial) companies. The sample contains the most traded enterprises (93 firms) listed in the Prague Stock Exchange during the period 1993 – 2000 (600 cases). Next, the results are summarized. In Chapter 4 conclusions of the study are provided.

2 . T h e o r e t i c a l   F r a m e w o r k

"The argument that leverage contains useful information for equity valuation has received theoretical support but little empirical research has been conducted. This is particularly true if we are talking about valuation models, with exceptions such

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2) The dividend decision is also regarded as a financial decision since any cash dividend paid reduces the amount of cash available for investment by the firm and therefore may have to be replaced either by a new issue of shares or an issue of debt. Therefore, equivalently, as Dobbins and Witt (1988, p. 115) claim: "If corporate managers can maximize the market value of the firm by manipulating dividend policy, then they should do so."

3) The optimal capital structure is defined as the situation, when the value of the firm cannot be increased by the change in capital structure.

4) Only a few Czech authors have been actually found, the most prominent being Krauseová (1995), Neumaier and Neumaierová (1996).

as Green et al. (1996), Rees (1997) and Fama and French (1998), although their results do not provide enough evidence about the influence of debt on equity valuation" (Giner and Reverte, 2001, p. 293). As Myers (2001, p. 81) states: "There is no universal theory of the debt-equity choice, and no reason to expect one."

However, there are several useful conditional theories – each of them helps to understand the debt-to-equity choice firms make. They include the optimal capital structure theory, the trade-off theory, the pecking-order theory, the signalling theory, the agency theory[5] and the free cash-flow theory. Although there is a need for arguments of only two of these in the empirical part of this paper, it should be beneficial to present a brief overview for all of them.

Optimal capital structure theory. The idea that there exists the optimal capital structure for each firm was supported by the traditional theory. Miller and Modigliani (1958) demonstrated that the capital structure has no impact on the value of the firm. The most current view is the synthesis of Modigliani and Miller theory with the influence of taxes and financial distress costs (for example trade-off theory below). Thus a firm value is value of unlevered firm plus present value of tax shield minus present value of financial distress costs. Then the leverage of a firm is relevant for a firm value and optimal capital structure exists.[6]

Proponents of the optimal capital structure theory maintain that the perception of debt by investors may be largely influenced by the extent of deviation of the firms debt-to-equity ratio with respect to its optimal level. As stated by Green et al. (1996, p. 199): "…departures from this optimal capital structure solution in either direction will not be rewarded by the market."

Trade-off theory. The trade-off theory of capital structure avoids extreme predictions of Modigliani and Miller and justifies moderate debt ratios instead. It says that the firm will borrow up to the point where the marginal present value of tax shield on additional debt is just offset by the increase in the present value of financial distress costs.

The theory recognizes that target debt ratios may vary from firm to firm. For example, companies with safe, tangible assets and plenty of taxable income to shield ought to have high target ratios. Unprofitable companies with risky, intangible assets ought to rely primarily on equity financing. But what is the reality? Just as the theory explains many industry differences in capital structure (high-tech growth companies, for example, whose assets are risky and mostly intangible, normally use relatively little debt) it fails in explaining a few "things". E.g. it cannot explain why some of the most successful companies thrive with little debt, thereby giving up valuable tax shield.

Signalling theory. Signalling theory is based on asymmetric information. Managers possess inside information not available to investors. Ross (1977) assumes that managerial rewards depend on the current value of the firm and its future returns, and managers know the distribution of future returns while outside investors do not. Market prices therefore only reflect public information. In this context of information asymmetry the amount of debt chosen (or, choice of a determined financial structure) acts as a signal: managers of firms with higher expected future returns choose larger amounts of debt because only the managers of the better firms are willing to incur the increased risk of bankruptcy and its related costs associated with higher debt. Therefore, in this case at least, an increase in leverage is perceived as "good

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5) Agency theory is perhaps equally much recognised in the finance literature as it is largely ignored in regards to the development of a firm's capital structure (see, Bruton, Merikas and Prasad, 1997).
6) For more details see Brealey and Myers (2000, Chapters 17 and 18).

news" as it signals the management's confidence in the corporation prospects. It is believed that these signals may not be mimicked by unsuccessful companies, because they are not able to repay the debt and the interest costs.

As Ross (1977, p. 23) points out: "One empirical implication of this theory is that, in a cross section, the values of firms will rise with leverage, since increasing leverage increases the market's perception of value". However, as clear as Ross' theory may appear at the first sight, it gets turned upside down with the proposition of Miller and Rock (1985). They suggest that the unanticipated external financing may be seen as "bad news", as it signals that the company has obtained less than expected cash flows from operations. If this is the case, the increase in leverage would not be a good signal regarding the future of the company.

The signalling theory provides theoretical foundations for an empirical study done by Giner and Reverte (2001) and, regardless of the conclusions made by Miller and Rock (1985), their example is followed in the empirical part of this study.

Pecking-order theory. The pecking order theory of Myers and Majluf (1984) and Myers (1984) says that the firm will borrow, rather than issue equity, when internal cash flow is not sufficient to fund capital expenditures. This theory is yet another consequence of asymmetric information – again, managers know more about their firms than outside investors do. This time, however, they are reluctant to issue stock when they believe the price is too low: they try to time issues when shares are fairly priced or overpriced. The pecking order theory then says that equity will be issued only when debt capacity is running out and financial distress threatens. Investors understand this, and interpret a decision to issue shares as bad news about the firm's prospects. That explains why stock price usually falls when a stock issue is announced.[7]

In other words, debt is "better" than equity when these information problems are important. Optimistic managers will prefer debt to undervalued equity, and pessimistic managers will be pressed to follow suit. Thus, in this theory there is no well-defined target debt-equity mix, because there are two kinds of equity, internal and external, one at the top of the pecking order and one at the bottom. As Myers (2001, p. 81) declares: "Thus, the amount of debt will reflect the firm's cumulative need for external funds."

The theory helps to explain why the most profitable companies generally borrow less – not because they have low target debt ratios but because they have internal funds sufficient for their capital investment programs.[8]

It is often noted that while the theory works fine in explaining the intra-industry relationships between profitability and financial leverage,[9] it seems to be less successful in explaining inter-industry differences in debt ratios. As Brealey and Myers (2000, p. 527) state: "Debt ratios tend to be low in high tech, high-growth industries, even when the need for external capital is great. There are also mature, stable industries – electric utilities, for example – in which ample cash-flow is not used to pay down debt. High dividend payout ratios give the cash-flow back to investors instead."

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7) The price drop at announcement should be greater when the information asymmetry is large. See, for example, Dierkens (1991) who confirms this using various proxies for information asymmetry.

8) To restate in academics' own words: "[that is]...why many firms seem to prefer internal financing to financing by security issues and, when they do issue, why they seem to prefer bonds to stock" (Myers and Majluf, 1984, p. 209).

9) A good example is given in Brealey and Myers (2000). Assuming firms that generally invest to keep up with the growth of their industries, the rates of investment will then be similar within an industry.

Agency models. So far, though it was not said so explicitly, it has been assumed that the interests of the firm's financial managers and its shareholders are perfectly aligned. What happens in case they are not? This is where some of agency theory models[10] come in. They are also based on asymmetric information but, unlike to any of the previous models, they have the advantage of being based on principal-agent considerations – firms are run by managers (agents) on behalf of shareholders (principals) – and, more importantly still, including agency costs. They assume that managers have some scope for pursuing their own interests at shareholders' expense because of asymmetric information and that it is the costly mechanisms imposed by principals upon agents in order to prevent these self-interest-performances of theirs that create the costs.

Agency costs can be triggered by several ways. For example, conflicts between debt and equity investors may arise (in fact, they do only arise) when there is a risk of default. This subject is well documented in Myers (1977). Suppose that managers act in the interest of stockholders and that the risk of default is significant. The managers will be then tempted to take actions that transfer value from the firm's creditors to its stockholders. There are several ways they can do this.[11]

Still a different way of how the agency costs may be generated is presented by the conflict between non-owner managers and stockholders. These include the so-called costs of "external equity". Non-owner managers have incentives to act in their own interest (e.g., by consuming perquisites, or being excessively risk averse) which may result in actions against the owners' interests.

Even so, how exactly can a pure agency theory help to understand the firm capital structure? The theory argues that managers will maximize their own wealth (see Jensen and Meckling, 1976). It has been demonstrated that a determinant of a top manager's compensation is the stability of the cash-flows of the firm (see Amihud and Lev, 1981). Thus, a manager may find it desirable to have a stable cash-flow over time rather than a cash-flow which, while totally higher, has greater variability.[12] Jensen and Meckling (1976) come up with the arguments of why the probability distribution of a firm's cash-flows is not independent of its capital structure, e.g., in reference to their study, when a company is highly levered, owners have incentives to engage in highly risky projects that will increase their wealth if they are successful but that will prejudice debt-holders if they are not.[13] As a conclusion can be stated, that agency relations rise agency costs to incentive, monitor and control agents. As Giner and Reverte (2001, p. 295) declares: "The 'optimal' capital structure will be achieved when agency costs are minimized."

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10) The models provide a framework for an analysis of contractual relationships. (Here, an agency relationship is defined through an explicit or implicit contract involving the delegation of some decision-making authority to the agent.) Agency costs are then defined as the total costs of structuring, administering and enforcing such contracts. As Smith (1989, p. 53) states: "They encompass all contracting costs frequently referred to as transactions costs, moral hazard costs and information costs." More on the subject, see Smith (1989). A thorough introduction into the economics of transaction costs, see Mlčoch (1999) or Van Koten (2002).

11) For example, managers may invest in riskier assets (see Jensen and Meckling, 1976), or they may borrow more and more and pay out cash to stockholders. In the latter case, the overall value of the firm is constant, but the market value of the existing debt declines – the cash received by the stockholders then more than offsets the decline in the value of their shares.

12) In fact, it has been shown that the stabilization of cash flows helps to entrench managers in their positions and to make their removal less likely (see Schleifer and Vishny, 1992).

13) In other words, higher risk increases the "upside" for stockholders while the downside must be absorbed by the firm's creditors (see Myers, 2001). As a consequence, it becomes necessary to establish control devices in debt contracts to avoid abuses (e.g., covenants that impose restrictions based on accounting numbers).

Free cash-flow theory. The free cash-flow theory, as first presented by Jensen (1986), tells us how to treat the firms with extra-high free cash-flows. This theory is mentioned as one of relevant conditional capital structure theories in Myers (2001). As Jensen (1986, p. 323) conjectures: "The problem is how to motivate managers to disgorge to cash rather than investing it below the cost of capital or wasting it on organizational inefficiencies". The answer to Jensen's problem can be debt, which forces the firms to pay out cash.[14]

In short (and most generally) the free cash-flow theory says that dangerously high debt levels will increase value, despite the threat of financial distress, when a firm's operating cash-flow significantly exceeds its profitable investment opportunities. Thus, the theory itself is designed for mature firms that are prone to over-invest (i.e. the so called cash-cow firms).

Of course, the whole subject of capital structure is so complex and confusing that no general theory will ever exist.[15] There will always be other theories to let us "better" but not wholly understand the capital structure "puzzle". That is the reason why the theories are called conditional – each emphasises certain costs and benefits of alternative financing strategies and none is designed to be general. Thus, it is for example equally possible to state (as opposed to the trade-off theory which pre-assumed the existence of tax-shields as the means of finding the target debt-ratios) that debt has no net tax benefits and thus that "high leverage, and increases in leverage and debt, are bad news about the value" (Fama and French, 1998, p. 841).

3. Empirical Analysis

In order to test for the relevance of two of the above mentioned theories (optimal capital structure theory and signalling theory) under Czech specific conditions, the Ohlson (1995) approach is adopted in a similar way as Giner and Reverte (2001) use it. As Ohlson (1995, p. 661) states: "The paper develops and analyzes a model of a firm's market value as it relates to contemporaneous and future earnings, book values, and dividends… The model satisfies many appealing properties, and it provides a useful benchmark when one conceptualises how market value relates to accounting data and other information."

The basic equation of our analysis is as follows:

$$P_{it} = \alpha_0 + \alpha_1 BV_{it} + \alpha_2 E_{it} + \varepsilon_{it} \tag{1}$$

where P_{it} = share price at year-end t for firm i, BV_{it} = book value of equity at year-end t for i'th firm, E_{it} = earnings for year t available to firm i's common shareholders.

But the accounting information and an information about the relevance of capital structure is still missing in equation (1). Therefore the book value of equity is split into its main components:

$$BV = TA - L \tag{2}$$

where TA = total assets, L = liabilities (it is non-equity liabilities, L = TA-BV).

Combined (1) with (2), the basic model is obtained:

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14) For the use of debt as the means of maintaining the managerial discipline, see Grossman and Hart (1982).

15) This confusing mixture of answers lead Myers (1984), in his presidential address to the American Economic Association to conclude that no clear solution exists as to why firms make certain choices concerning their debt-equity mix.

$$P_{it} = \beta_0 + \beta_1 TA_{it} + \beta_2 L_{it} + \beta_3 E_{it} + \varepsilon_{it} \qquad (3)$$

First, it is tested whether the valuation multiples on the two components of book value (TA and L) are the same or not. Thus the first null hypotheses can be formalised as follows:

H_0^1: $\beta_1 = -\beta_2$, that is, TA and L are equally valued by the market.

Next, the influence of the other economic arguments is examined by adding the firm-specific dummy variables into the basic model.

In previous part of this paper it is theorised that the firm leverage level is likely to be perceived negatively by the market in case it strays to either side of the debt-to-equity ratio with respect to an optimal level. Unfortunately, there is a problem in testing this argument empirically – the knowledge about how to determine this target level is lacked. Nevertheless, as Giner and Reverte (2001, p. 298) declare: "…two proxies for the target capital structure have been commonly used in the literature:

– the median of the debt-to-equity ratio for all the firms in a particular year,

– the average leverage of the industry to which the firm belongs."

Both proxies were examined and the first one was found more appropriate. Therefore the target (=optimal) debt ratio is calculated for each year under analysis. Then the quartiles of the distribution of the debt-to-equity ratio for each year are computed, considering the cases included in the top and bottom quartiles as those farthest from the target level. Thus a dummy variable D_1 is specified as taking the value 1 in those cases which are farthest from the target level and 0 otherwise (the cases in the middle two quartiles, it means those regarded as the closest to the target level).

This way, the second null hypothesis is defined as follows:

H_0^2: The value of debt does not depend on the closeness of the leverage level of the company with respect to the "optimal level".

The following model is used in order to test for the hypothesis H_0^2:

$$P_{it} = \gamma_0 + \gamma_1 TA_{it} + \gamma_2 L_{it} + \gamma_3 L_{it} D_1 + \gamma_4 E_{it} + \varepsilon_{it} \qquad (4)$$

Here the parameter γ_3 measures an incremental effect on the dependent variable for those cases that stray "far" apart from the target debt ratio (optimum) in either direction.

Thus the hypothesis H_0^2 may be formalised as follows: $\gamma_3 = 0$.

Now, according to the signalling theory, changes in debt may be either positive or negative signal. It is a good signal in case the management is confident in the corporation prospects and "the debt" is going to be used to carry out new investments enhancing the firm's potential. On the other hand, it is a bad signal if the debt is raised in order to compensate for the less-than-expected cash-flow from operations. In other words, the informative value of debt may be different according to whether there is some bright future for the company or vice versa. But how to proxy for the future prospects facing the firm? The price-to-book ratio (P/B ratio) may be used. As Penman (1996, p. 256) states, the P/B ratio is "nominated as the appropriate indicator of earnings growth". It can be hypothesised that the debt is more valued by investors for those firms with a high P/B ratio relative to those with a small P/B ratio.

Thus the third null hypothesis follows as:

H_0^3: The value of debt does not depend on the future expected earnings growth of the firm.

In this case, D_2 is defined as a dummy variable taking the value of 1 in those cases in which the P/B ratio falls in the interval above the median value for all the

firms in the sample. It takes the value of 0 for other cases. The following model is estimated in order to test for the third hypothesis:

$$P_{it} = \delta_0 + \delta_1 TA_{it} + \delta_2 L_{it} + \delta_3 L_{it} D_2 + \delta_4 E_{it} + \varepsilon_{it} \qquad (5)$$

The coefficient δ_3 represents the differential value of debt for those firms in the sample that have a relatively high expected earnings growth.

Thus the hypothesis H_0^3 may be formalised as follows: $\delta_3 = 0$.

In order to check for a mutual effect of the level of leverage (D/E ratio) and of the future prospects of the firm (P/B ratio) on the value of debt, the following model, which is a combination of models (4) and (5), is estimated:

$$P_{it} = \omega_0 + \omega_1 TA_{it} + \omega_2 L_{it} + \omega_3 L_{it} D_1 + \omega_4 L_{it} D_2 + \omega_5 E_{it} + \varepsilon_{it} \qquad (6)$$

To provide an example of the interactive effect of both categorical variables on the value of debt can be said, for example, that in case of the company whose D/E ratio falls far away from the target level and whose P/B ratio is higher than the median for all firms, the coefficient on debt would be $(\omega_2 + \omega_3 + \omega_4)$. Similarly, in case of the company whose D/E ratio would happen to stray far away from the optimal debt level, but whose characteristic P/B ratio would in the same time be lower than the median for all firms, the coefficient on debt would be $(\omega_2 + \omega_3)$.

Combined H_0^2 and H_0^3, the last hypothesis may be stated as follows:

H_0^4: The value of debt depends neither on the closeness of the leverage level of the company with respect to the "optimal level" nor on the future expected earnings growth of the firm. Formally, $\omega_3 = 0$ and $\omega_4 = 0$.

3. 1 *Data*

The data used in the analysis were collected in parts from Reuters Spectrum® Disc Explorer 2.0. (that is, in case of the amount of total assets, equity, earnings, as well as the EPS ratio),[16] in parts from the finance server www.ariadna.cz (as was the case of the actual number of shares for individual companies), and from *Burzovní noviny*, an official stock-market attachment of *Hospodářské noviny* daily newspapers, where prices of ordinary shares at the year-end were obtained.

The sample comprises a total of 93 industrial and commercial companies listed on the Prague Stock Exchange within the period 1993 – 2000.

A problem might present the accounting changes that occurred over the period under examination due to the adaptation of the Czech system to the International Accounting Standards (IAS). As demonstrated by Giner and Rees (1999), the changes in (Spanish) accounting system were followed by a change in the value relevance of the accounting information. Nevertheless, this complication is disregarded in this study.

As in many other studies of this nature, financial companies have been excluded due to the particular characteristics of the accounting system in this industry. The initial sample is then composed of 600 observations. After deeper quantitative analysis, it was decided to eliminate outliers as the cases in which standard residual value, it means difference between observed and predicted value divided by the square root of the residual mean square, was bigger than ± 2 times standard

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16) Total assets are taken from line (001) of the balance sheet, equity from line (062). (Non-equity) liabilities variable is calculated as total assets – equity. Earnings are taken from line (060) of the income statement. For any inconsistency, please, refer to Vysušil (1998).

deviation (i.e. 22 cases[17]). Thus the sample used for analysis comprises the total of 578 observations.

3. 2 *Results*

Table 1 presents descriptive statistics of all the variables involved in the study (including D/E and P/B ratios). All the variables (except for earnings) are positively skewed and present a significant degree of kurtosis, or "peakedness", as is normal for cross-sectional valuation models (see Giner and Reverte, 2001, p. 301).

Table 1
Descriptive Statistics for the Full Sample (1993 – 2000, *n* = 578, in CZK)

Regressor	Mean	Median	Minimum	Maximum	Std. dev.	Skewness	Kurtosis
P	778.680	411.000	7.950	4513.000	842.939	1.427	1.585
TA	2596.436	1914.367	1.361	60792.060	4621.726	8.854	92.124
L	1398.463	670.930	-1265.230	59584.180	4495.732	9.606	103.061
E	30.772	24.240	-1066.560	986.409	184.510	-0.713	9.656
DE	1.497	0.651	-22.283	106.940	6.487	9.975	138.217
PB	0.921	0.468	-2.981	31.229	2.534	8.525	82.551

The fact, that the distributions for all our variables are more peaked than a normal distribution is especially evident in case of debt-to-equity ratio (DE variable) with the associated value reaching close to 140. Price-to-book ratio (PB variable), total assets per share (TA) and liabilities per share (L) present similarly high figures (82.55, 92.12 and 103.06, resp.). Given a very similar nature of the samples, the latter two figures are almost six times as high in comparison to the figures in Giner and Reverte (2001), where the respective values fall in the interval of (12.8 – 19) for all of the first four variables. Let us now take a few notes on DE and PB variables.

Table 2
Frequency Table for the Regressors DE and PB (1993 – 2000, *n* = 578)

Frequency	cases	%		cases	%
DE<0.5 DE>0.0	191	33.04	PB<0.5 PB>0.0	289	50.00
DE>0.5 DE<1.0	233	40.31	PB>0.5 PB<1.0	147	25.43
DE>1.0 DE<1.5	65	11.25	PB>1.0 PB<1.5	83	14.36
DE>1.5 DE<2.0	26	4.50	PB>1.5 PB<2.0	24	4.15
not selected	63	10.90	not selected	35	6.06

It can be seen that about 33 % (40.3 %) of all cases in our sample have a debt-to-equity ratio in the interval (0.0 – 0.5) ((0.5 – 1.0), resp.). Similarly, about 50 % (25.4 %) of them have their price-to-book ratio in the interval (0.0 – 0.5) ((0.5 – 1.0), resp.). Around 67 % of all cases have DE ratio higher than 50 %. Although it often depends both on economic factors and society's general feeling towards credits, any

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17) Perhaps it is desirable to note that 11 out of 22 outliers belong to only two companies: Pivovar Radegast (breweries) and Philip Morris (a tobacco company).

company that has a debt to equity ratio of over 40 to 50 % should be looked at more carefully to make sure there are no liquidity problems. In case of the PB ratio, Czech market seems to value more than 3/4 of the companies below their book value, with around 50 % of all the companies in the sample valued at less than 50 % of their BV.

To test the hypotheses, linear regression models are utilised. Detailed results of individual tests for the fulfilment of basic assumptions of general linear regression model (GLRM) now follow.[18]

Testing for normality, two formal statistical tests are used. The Shapiro-Wilk W-test (see Shapiro, Wilk and Chen, 1968) and a test as described by Cuthbertson et al. (1992) or Kmenta (1986). The result of both tests is the rejection of the hypothesis of normality at 5% (1%) level of significance. Inspecting the pattern of normal probability plot of residuals visually, a slight deviation from the normal line can be inferred (an *S*-shape curve clarifies the judgement).

Thus the estimated disturbances are not normally distributed. However, as the fact itself "does not appear to have a very serious consequences for the least squares estimation" (Kmenta, 1986, p. 262), the violation of this assumption is disregarded in the analysis.

Testing for homoskedasticity, the Goldfeld-Quandt (parametric) test as described in Hušek (1999) and the White heteroskedasticity test (White, 1980) are employed. The hypothesis of homoskedasticity is rejected at 5% (1%) level of significance by both tests.

Thus a substantial heteroskedasticity problem has been found. To overcome this econometric problem, a procedure is used in all tests that allows to obtain heteroskedasticity-consistent standard errors (ROBUSTSE option in TSP 4.5 software).[19]

Table 3 below shows the correlation coefficients among the variables used in the analysis. There is an apparent and serious correlation between the total assets per share and the (non-equity) liabilities per share (0.987).

Table 3
Correlation Matrix (1993 – 2001, n = 578)

	TA	L	E
P	0.168	0.056	0.560
TA		0.987	0.094
L			-0.006

Generally, the presence of multicollinearity in the sample poses a major problem – it results in large standard errors of the estimated regression coefficients and leads to what is often referred to as instability of the regression estimates. However, despite all that has been just said, the results prove to be relatively consistent and stable across the numerous regressions that were run. Similar fact experience Giner and Reverte (2001, p. 301): "As expected, there exists a high correlation between total assets and total debt per share (0.96), causing a collinearity problem… our results are quite consistent and stable across the numerous regressions we have

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18) Here just the results of tests on our basic equation (2) for n = 578 are presented.
19) ROBUSTSE option causes the variance of the coefficient estimates, the standard errors, and associated *t*-statistics to be computed using the formulas suggested by White, among others (see Davidson and MacKinnon, 1993). Please, refer to TSP 4.5 software for further details.

run. Hence, we do not think that this problem is significantly affecting the tenor of our results."

The results of basic model (3) coefficients estimating are presented in Table 4.

Table 4
Regression Results for Model (3): $P_{it} = \beta_0 + \beta_1 TA_{it} + \beta_2 L_{it} + \beta_3 E_{it} + \varepsilon_{it}$

Year	Intercept	TA_t	L_t	E_t	Adj. R^2	N obs.
1993	409.824	0.325	-0.328	1.865	0.310	43
	2.823*	2.203**	-2.175**	3.393*		
1994	234.767	0.514	-0.520	3.794	0.522	49
	1.808***	3.400**	-3.404**	5.411*		
1995	78.983	0.476	-0.481	3.200	0.702	76
	0.598	3.844*	-3.849*	5.689*		
1996	-274.174	0.935	-0.925	1.336	0.474	81
	-1.840***	6.394*	-6.051*	1.313		
1997	-277.214	0.834	-0.824	0.687	0.487	88
	-1.856***	6.297*	-5.944*	0.809		
1998	-350.893	0.803	-0.803	0.112	0.614	86
	-2.641**	6.400*	-5.418*	0.359		
1999	-96.239	0.620	-0.601	0.425	0.550	80
	-0.809	4.614*	-2.962**	1.043		
2000	-48.457	0.459	-0.380	0.930	0.693	75
	-0.522	4.743*	-2.827*	1.624		
Pooled	1.580	0.621	-0.619	1.005	0.506	578
	0.033	13.638*	-13.445*	4.482*		

Note: * (**,***) significant at 1% level of significance (5%, 10% level, respectively). Figures under estimated values represent the *t*-statistics.

All estimated coefficients are statistically significant at 1% level of significance in the case of pooled sample. From a valuation point of view, this implies that not only the profit figure is relevant but also the book value components.

Now it can be directly proceeded to the test of a hypothesis that the valuation multiples associated with the two components of the book value of equity are the same.

In order to check for the "sameness" of valuation multiples, the test on equality of coefficients (see Johnson et al., 1987) is used. As result, the null hypothesis that the two components of book value are the same ($\beta_1 = -\beta_2$) is not rejected at 5 % (1%) level of significance. In other words, the decomposition of equity figure into the total assets and the non-equity liabilities components provides no more information to the market than the bottom-line figure itself (BV).

Observing Table 4 still further, annual regressions are run in all the estimations in order to check for the consistency of results across years. It can be seen that both estimated coefficients on total assets as well as liabilities are statistically significant at either 1 or 5 per cent levels, both keeping the same sign throughout the period. Hence, debt seems to be relevant in explaining share prices. As with regard to ear-

nings, it is significant only in three out of eight years. As to the explanatory power, the adjusted R^2 ranges from 31 % in 1993 to 70 % (as is the case of 1995).

Results for model (4) estimation are portrayed in Table 5. Once more, coefficients for the pooled regression (adjusted $R^2 = 0.515$) are all but for an intercept term significant at 1% level.

Table 5
Regression Results of Model (4): $P_{it} = \gamma_0 + \gamma_1 TA_{it} + \gamma_2 L_{it} + \gamma_3 L_{it}D_1 + \gamma_4 E_{it} + \varepsilon_{it}$

Year	Intercept	TA_t	L_t	E_t	L_tD_1	Adj. R^2	N obs.
1993	402.568	0.311	-0.228	1.836	-0.085	0.294	43
	2.733*	2.087**	-0.753	3.327*	-0.352		
1994	182.301	0.437	0.028	3.581	-0.468	0.550	49
	1.366	2.660**	0.078	4.524*	-1.794*		
1995	81.067	0.420	-0.250	3.247	-0.173	0.707	76
	0.620	3.139*	-1.222	5.751*	-1.658		
1996	-106.331	0.514	0.196	1.252	-0.691	0.591	81
	-0.839	3.765*	0.810	1.406	-5.044*		
1997	-234.050	0.716	-0.520	0.675	-0.184	0.496	88
	-1.575	4.420*	-1.937***	0.791	-1.367		
1998	-372.213	0.764	-0.643	0.022	-0.122	0.621	86
	-3.221*	6.175*	-3.211*	0.079	-1.210		
1999	-93.604	0.567	-0.433	0.440	-0.114	0.550	80
	-0.741	3.563*	-1.401	1.057	-0.659		
2000	-45.022	0.419	-0.263	0.914	-0.079	0.692	75
	-0.483	3.728*	-1.308	1.604	-0.754		
Pooled	12.928	0.552	-0.402	0.993	-0.147	0.515	578
	0.268	10.790*	-4.584*	4.401*	-2.849*		

Note: * (**,***) significant at 1% level of significance (5%, 10% level, respectively). Figures under estimated values represent the t-statistics.

Furthermore and quite alike to the results of Giner and Reverte (2001), the statistical significance of γ_3 is questionable in six out of eight years when results of annual regressions are focused on. But in the two of eight years and primarily in the case of pooled sample, the second null hypothesis is rejected. Because γ_3 shows negative sign, revealing that the debt is more penalized for the companies that deviate "too far" in either direction from the target debt level as measured by the median of the debt-to-equity ratio for all the firms in a particular year. Clearly, this suggests a consistency of the results with the conclusions of an optimal capital structure theory as mentioned above.

What follows are results of model (5) estimation.

Table 6
Regression Results of Model (5): $P_{it} = \delta_0 + \delta_1 TA_{it} + \delta_2 L_{it} + \delta_3 L_{it}D_2 + \delta_4 E_{it} + \varepsilon_{it}$

Year	Intercept	TA_t	L_t	E_t	L_tD_2	Adj. R^2	N obs.
1993	408.811	0.327	-0.332	1.854	0.002	0.292	43
	2.722**	1.942***	-1.088	2.660**	0.011		
1994	114.344	0.422	-0.425	2.764	0.809	0.687	49
	0.821	2.909*	-2.880*	3.395*	3.377*		
1995	72.410	0.551	-0.807	2.806	0.254	0.737	76
	0.571	4.473*	-4.013*	4.938*	1.821***		
1996	-219.547	0.988	-1.342	1.006	0.369	0.554	81
	-1.571	6.894*	-4.550*	1.282	1.530		
1997	-178.122	0.891	-1.280	0.200	0.403	0.592	88
	-1.319	7.186*	-6.415*	0.268	3.211*		
1998	-146.466	0.481	-0.494	0.654	0.393	0.765	86
	-1.421	4.019*	-3.935*	1.740***	5.058*		
1999	-166.487	0.473	-0.478	0.003	0.586	0.823	80
	-1.986***	5.325*	-5.142*	0.012	5.239*		
2000	21.077	0.461	-0.524	0.755	0.147	0.706	75
	0.196	4.453*	-2.661**	1.257	0.945		
Pooled	8.487	0.617	-0.640	0.966	0.043	0.520	578
	0.180	13.535*	-11.555*	4.281*	1.539		

Note: * (**,***) significant at 1% level of significance (5%, 10% level, respectively). Figures under estimated values represent the *t*-statistics.

Although the coefficient δ_3 is greater than zero in all regressions, the statistical insignificance in three of eight annual results and mainly in the case of pooled sample does not allow to reject the third null hypothesis. But the fact that δ_3 is greater than zero is consistent with the fundamental conclusions of the "signalling" theory which is operated in previous chapter in order to explain the influence of liabilities on share prices. The debt may be seen as a positive signal for the companies with "brighter" prospects or, rather more precisely, for a group of companies with a higher expected earnings (proxied here by a P/B ratio) relative to those for which an expected growth in earnings is not so bright.

In Table 7, the estimation results of the model (6) can be examined. This time, the interaction of both categorical variables as represented by dummies D_1 and D_2 is examined.

Apparently, almost all estimated coefficients are highly significant in the pooled sample. None the less, *t*-statistic for the parameter on the second interaction term, ω_4, starts to be significant only at 12.5% level. Still, it is assumed that the significance of the term in question was predicted à priori and that 12.5% level is fine. Along these lines, a closer look at the signs related to both contextual regressors can be taken - market penalizes debt more in those cases when the company deviates too far from the target "debt" value ('–' sign in the case of ω_3) and, in concordance with the signalling theory, debt is perceived to be a positive signal for those companies with a higher expected earnings growth relative to the other firms ('+' sign in the case of ω_4).

Table 7
Regression Results of Model (6): $P_{it} = \omega_0 + \omega_1 TA_{it} + \omega_2 L_{it} + \omega_3 L_{it}D_1 + \omega_4 L_{it}D_2 + \omega_5 E_{it} + \varepsilon_{it}$

Year	Intercept	TA_t	L_t	E_t	L_tD_1	L_tD_2	Adj. R^2	N obs.
1993	402.252	0.311	-0.230	1.833	-0.085	0.001	0.275	43
	2.684**	1.802***	-0.535	2.631**	-0.345	0.000		
1994	104.076	0.403	-0.260	2.7497	-0.145	0.768	0.683	49
	0.751	2.624**	-0.893	3.3240*	-0.719	3.082*		
1995	74.539	0.491	-0.559	2.8458	-0.193	0.261	0.745	76
	0.592	3.740*	-2.228**	4.9480*	-1.732***	1.518		
1996	-88.988	0.616	-0.290	1.0106	-0.589	0.284	0.635	81
	-0.707	4.293*	-0.665	1.3824	-3.970*	1.247		
1997	-144.783	0.793	-1.022	0.1999	-0.151	0.395	0.597	88
	-1.080	5.354*	-3.491*	0.2645	-1.229	2.989*		
1998	-148.743	0.480	-0.486	0.6455	-0.008	0.391	0.762	86
	-1.582	3.776*	-2.594**	1.8308***	-0.106	5.432*		
1999	-165.394	0.458	-0.429	0.0093	-0.034	0.583	0.821	80
	-1.967***	4.511*	-2.286**	0.0367	-0.298	5.158*		
2000	25.982	0.418	-0.400	0.7355	-0.085	0.150	0.706	75
	0.244	3.625*	-1.504	1.2340	-0.836	0.993		
Pooled	19.425	0.549	-0.429	0.9545	-0.143	0.043	0.528	578
	0.408	10.829*	-4.650*	4.2072*	-2.823*	1.537		

Note: * (**,***) significant at 1% level of significance (5%, 10% level, respectively). Figures under estimated values represent the *t*-statistics.

The "overall" coefficient on debt can be very easily calculated in Table 8.

Table 8
Debt Coefficients (model (6), pooled sample)

	Optimal D/E ($D_1 = 0$)	Non-optimal D/E ($D_1 = 1$)
High P/B ($D_2 = 1$)	-0.386	-0.529
Low P/B ($D_2 = 0$)	-0.429	-0.572

4. Conclusion

The most prominent conditional capital structure theories are summarised (the optimal capital structure theory, the trade-off theory, the pecking-order theory, the signalling theory, the agency theory and the free cash-flow theory) in order to examine how firm capital structure is determined. However, there is no general solution why firms make certain choices concerning their capital structure. Moreover, the opposite propositions can be advocated by different theories. That is the reason why the theories are called conditional – that is, each emphasises certain costs and benefits of alternative financing strategies and none is designed to be general.

In the empirical part, Ohlson valuation model is used in order to examine the informative value of debt under several firm-specific circumstances (i.e. contextual approach is adopted). Testing for all hypotheses (estimation of all models) is based on a sample of data for the Czech (non-financial) companies. The sample contains the most traded enterprises (93 firms) listed on the Prague Stock Exchange during the period 1993 – 2000 (600 cases).

Book value of equity is decomposed in its two main components, total assets and liabilities, in order to test whether investors price them equally. Thus the first hypothesis is defined as follows.

Hypothesis H_0^1 is accepted by the estimation of model (3). Therefore the decomposition of equity figure into the total assets and the non-equity liabilities components provides no more information to the market than the bottom-line figure itself. Then two dummy variables are defined to analyze the pertinence of the optimal capital structure theory and the signalling theory. Consequently, following hypotheses are tested (by estimating models (4) and (5)).

H_0^2 is rejected, what is consistent with the conclusions of the optimal capital structure theory. H_0^3 cannot be rejected because of statistical insignificance in the case of pooled sample. But according to some of across-years regression results, H_0^3 is rejected, what is consistent with the deductions of the signalling theory.

To explore the mutual effects of both theories, the last hypothesis is tested by the coefficients estimation of model (6) as follows.

H_0^4 cannot be rejected, but at 12.5 % level of significance. In this case it can be stated that market penalizes debt more in those cases when the company deviates too far from the target "debt" value and, in concern with the signalling theory, debt is perceived to be a positive signal for those companies with a higher expected earnings growth relative to the other firms.

Finally, several comments should be made as with regard to the possible limitations and/or prospective extensions of this study.

First, it is reasonable to assume (and it is always the case) that had the sample been larger, the conclusions would have been much clearer if not at least more exact. Furthermore, the small sample size also prevented us from using fixed-effects models since the introduction of firm-specific dummy variables would have resulted in a significant loss of degrees of freedom and rendered the parameter estimates non-robust and imprecise. Both problems are, however, dependent on time.

Second, as mentioned in the study by Giner and Reverte, the results could be dependent upon the accounting-based valuation framework used. They implicitly suggest that although the Ohlson model has been relatively successful in an empirical setting, there are underlying assumptions that we should pay attention to each time we apply the model in the real world conditions.

Third, the tests relied on two proxies (DE and PB ratio dummies). It is possible that if other (even similar) measures had been used instead, different results could have been obtained.

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