

# Financial Thesis paper

## Leverage and how it affects shareholder value

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### **ABSTRACT**

This paper investigates the factors that affect a firm's capital structure decision and how the capital structure affects a firm's shareholder value. The two most important theories that are used in the thesis are the trade-off and the pecking theory. By using a dataset consisting of 502 large US firms during the years 2005-2014 we find that 1) The factors that affect a firm's capital structure are profitability, firm size and firm risk 2) A firm's leverage has a positive effect on shareholder value. In general, we find that the pecking order theory rather than the trade-off theory can be used to explain the capital structure of a firm.

Financial thesis paper

*“Leverage and how it affects shareholder value”*

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## 1. INTRODUCTION

To lay the foundation for a company's opportunities to exist and conduct any business at all, financial funds need to be provided. The intention of this paper is to investigate factors that affect capital structure decision. The two most well known theories regarding the latter, the trade-off theory and the pecking order theory, will be tested. Much of the inspiration of this paper comes from Eugene Fama and Kenneth French (2002), whom in their paper "Testing Tradeoff and Pecking Order Predictions About Dividends and Debt" test the predictions made from both these theories, which in some cases go against each other. We will compare our results with theirs as well as to other related results concerning our study.

With the above-mentioned theories regarding capital structure in mind, we use a fixed effects model in a dataset of 502 of the biggest US firms in the period 2005-2014 asking two distinct questions:

- What affects a firm's decision regarding its leverage ratio?
- What is the effect of leverage on shareholder value?

The trade-off theory predicts among other things, that as profit increases so does the leverage of the firm. The steadier the cash flow, the lower the risk of bankruptcy, which leads to lower debt. Fama and French (2002), in their model, use return on assets to measure profitability. When testing for effects of cash flow, they use firm size, stating that this variable is as much a proxy for age as well as for the cost of accessing outside capital. Since return on assets is predicted by the pecking order theory to have a negative relationship with leverage, the effect of return on assets is a dividing point between the two theories.

On the effect of certain variables, both theories predict the same result. For example regarding investment, as investment increase - so does debt. Fama and French (2002) confirm this, but are not able to explain what drives the effect. The empirical evidence from Fama and French (2002) gives the pecking order right, the higher profit in a firm the lower debt financing. Further, the

paper also reports proof for a weakness in the framework of the pecking order theory, which concerns the large equity issues in low-leverage firms - per se a contradiction and a big dent to the pecking order. The idea is that smaller firms use less equity since they are assumed to have a higher degree of asymmetric information.

Taking one step further than Fama's and French's findings we will investigate the effect of leverage on the value of the equity of the firm. To this we want to include the diminishing effects of debt - predicted by the trade off theory's statement of an optimal level of debt. This implies that if debt would be too high, it would have a negative effect on the equity value of the firm. The yearly cash flow risk, measured by its standard deviation, in a firm is included in our models as an independent variable, something Fama and French (2002) mentions in a short comment in their paper and choose to include in their variable firm size. We also choose to work with the ratio of the total debt and total outstanding equity rather than testing both the debt-to-book-value of assets and debt-to-market-value of the firm.

The paper is divided into the following sections. Section 2 gives the theoretical framework we use, going deeper into the trade-off and the pecking order theory as well as overview some theories connected with these. Section 3 goes in to methodology and which model we choose to answer our questions. In section 4 we present the data we are using. Section 5 is about our expectations about and the results of the models and in section 6 we sum up our effort with making conclusions and present answers to our questions.

## **2. THEORY**

Modigliani and Miller (1958) concluded that a firm's market value, in equilibrium, is independent of its capital structure<sup>1</sup>. The trade-off theory (Kraus and Litzenberger, 1973), to some degree an extension of the M&M's revised propositions, weighs the cost of debt as well as the benefits of the same. The cost of debt is referring to the cost occurring from financial distress of having too high debt and the deadweight cost of bankruptcy. Expansions of the trade-off

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<sup>1</sup> Modigliani. Miller. (1958). "*The Cost of Capital, Corporation Finance and the Theory of Investment*". The American Economic Review. Vol. 48. No. 3. p 296.

theory have been made over the years, Grossman and Hart (1982) stated that another benefit from debt is the reverse of the negative aspect from bankruptcy cost. They argued that if managers would suffer personally when bankruptcy occurs, then they would work hard to avoid this - decreasing the agency problem. Hence, the trade-off theory argues that there is an optimal level of debt, which companies should strive for, and that should drive the capital structure decision.

Miller (1977) acknowledges the deadweight costs of bankruptcy attached to debt financing but thinks that the great emphasis on the supposed trade-off between tax gains and bankruptcy costs is too large. He also questions why we have seen so little change in capital structure over time when the optimal capital structure is a matter of balancing tax advantages against bankruptcy costs. It does not seem to be a question of a lag of adjustment since the disequilibrium (non-optimal) structure of firms has been around for thirty years without changing, Miller concludes in 1977<sup>2</sup>.

Another theory, named the pecking order theory was first presented by Gordon Donaldson in the 60's and expanded by Myers and Majluf (1984). According to this, most firms don't have a well defined debt-to-value ratio. This theory evolves from the question of asymmetric information in regard of equity financing, and whether the current management is most concerned with present above future shareholder.

This implies that firms don't prefer to be in situations where they cannot finance their activities internally and that the least attractive situation to be in is when you need to issue equity to fund your project. Asymmetric information and its byproducts is an important aspect in the pecking order world (Myers, 1984). Myers (1984) discusses the obvious ambiguity that a pecking order goes against shareholders interest, because of the information gap between issuers and buyers<sup>3</sup>. The manager of a firm will be worried about the real intrinsic value of the firms existing shares, i.e. the "old" shareholders wealth, and wants the price in the rights issue to at least reflect the true intrinsic value of the equity.

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<sup>2</sup> Miller. M. "*Debt and Taxes*". (1977). *The Journal of Finance*. Vol. 32. No. 2. p. 246.

<sup>3</sup> Myers. S. "*The Capital Structure Puzzle*". (1984). *The Journal of Finance*. Vol. 39. No. 3. p. 583.

But since this is obvious to the investors buying the “new” equity, they will assume that the firm manager doesn’t act in their interest regarding the matter of the “new” equity’s price.

From this, Myers (1984) states a few decision rules. Reflecting the costs of external financing and the advantage in debt over equity the general rule is “issue safe securities before risky ones”<sup>4</sup>. The next ground rule is “issue debt when investors undervalue the firm, and equity, or some other risky security when they overvalue it”<sup>5</sup>. This reflects the discussion about whose information is best, the manager’s on the inside or the investor’s on the outside?

Regarding the timing aspect of issuing securities Myers (1984) states that “firms apparently try to time stock issues when stock prices are high”<sup>6</sup>. Given that firms seek for external financing, they will be more likely to carry through the issuing of risky securities when the stock price has risen than when it has fallen. This fact is somewhat embarrassing for both the trade-off theory and the pecking order theory. The first one states that when firm value rises, the debt-to-value rises – which is not the case in the above scenario. The pecking order hypothesis states that manager’s superior information over the investor’s gives the advantage in a rights issue - but investors ability to interpret the subconscious message of a rights issue most probably mitigate this advantage. It’s both possible and plausible that the manager just got “bad” news, and want to profit from the current “good” situation in the firm before the bad news goes public.

If we compare a profitable firm to an unprofitable firm in the same industry sector, the first one will probably end up with a really low level of debt with respect to firms in the same industry sector, while the second one will end up having a really high level of debt followed by increased costs of financial distress (Myers 1984). Both of them may put some effort in rebalancing their capital structures but in the same time they may not. The problem with asymmetric information mentioned above returns in this case. Since investors don’t know the intentions of a firm, there will always be an individual aspect of each single firm to be taken into consideration while analyzing the nature of capital structures.

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<sup>4</sup> Myers. S. “*The Capital Structure Puzzle*”. (1984).The Journal of Finance. Vol. 39. No. 3. p. 584.

<sup>5</sup> Myers. S. “*The Capital Structure Puzzle*”. (1984).The Journal of Finance. Vol. 39. No. 3. p. 585.

<sup>6</sup> Myers. S. “*The Capital Structure Puzzle*”. (1984).The Journal of Finance. Vol. 39. No. 3. p. 586.

Myers (1984) looks at the situation above saying that “if this story is right, average debt ratios will vary from industry to industry, because asset risk, asset type, and requirements for external funds also vary by industry. But a long-run industry average will not be a meaningful target for individual firms in that industry”<sup>7</sup>.

Focusing on further aspects of what drives debt level in firms Jensen and Meckling (1976) explain that due to agency cost, a firm will use a non-optimal debt level if managed by some other than the sole owner. The reasons for this are given by utility maximization and incentives. Since the upside of further debt often is small and a possible bankruptcy might cause the loss of employment agents, managers of firms, tend to avoid further risk.

### 3. METHODOLOGY AND MODELS

To investigate the time constant effect when looking at capital structure of firms we use a fixed effects model. The advantage of using a fixed effects model is that it allows for the time varying effects in our explanatory variables to be correlated with the time constant effect  $a_i$  (Wooldridge 2014). Another model, which is plausible when measuring effects over time, is the random effects model. This allows for the explanatory variables to be constant over time, which most probably is not the case with our data.

Concept of fixed effects model:  $E(y_{it}) = a_i + \beta_1 E(x_{it}) + \dots + \beta_k E(x_{itk}) + E(u_{it})$

Concept of random effects model:  $y_{it} = \beta_0 + \beta_1 x_{it1} + \dots + \beta_k x_{itk} + v_{it}$ , where  $v_{it} = a_i + u_{it}$

To definitely decide between using the random or fixed effects model we test both the models for consistency with a random effects model. This means that the null-hypothesis is that the random effects model is consistent. In our case we got significant results in both tests of the models and therefore we reject the null-hypothesis and choose to use the fixed effects model<sup>8</sup>.

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<sup>7</sup> Myers. S. “*The Capital Structure Puzzle*”. (1984). *The Journal of Finance*. Vol. 39. No. 3. p. 590.

<sup>8</sup> See Sargan-Hansen test in table 3 and Hausman test in table 4.

Also, in a fixed effect model the attrition, which is the dropout of observation for some unobserved reasons (for example a merger between two firms in our sample) (Wooldridge, 2014), is allowed to correlate with the time-constant  $\alpha_i$  which in this case solves a potential problem with eventuell occurring bias in our model.

To help us answering our questions we construct two regression models. These are:

(1)

$$\text{Debt to Equity}_{it} = \alpha_i + \beta_1 \text{roa}_{it} + \beta_2 \text{tangibility}_{it} + \beta_3 \text{marketcap}_{it} + \beta_4 \text{std\_return}_{it} + \beta_5 \text{cf\_std\_proc}_{it} + u_{it}$$

(2)

$$\text{Pb}_{it} = \alpha_i + \beta_1 \text{roa}_{it} + \beta_2 \text{debtequity}_{it} + \beta_3 \text{std\_return}_{it} + \beta_4 \text{cf\_std\_proc}_{it} + \beta_5 \text{intcov}_{it} + \beta_6 \text{debtequity\_square}_{it} + u_{it}$$

In (1), we construct a similar model to that Rajan and Zingales used in their paper “*What do we really know about capital structures?*” (2005). We use leverage as a dependent variable. As independent variables we use profitability and firm size. We also include the firm risk, derived from the preceding year’s volatility in the share price, and the cash flow risk, preceding year’s quarterly volatility in free cash flow. We have not noticed a test that includes the two latter variables, in any previous study that we have read.

In (2) we test for the effect of leverage on market performance and equity value of the firms. Inspired by other papers regarding firm performance, among those the studies of the effect of ownership to performance by Villalonga and Amit (2006), where they choose to explain Tobin’s q we think that we get a result that we can decipher more stringently by choosing the price-to-book ratio (denoted Pb above) as endogen variable. Since our focus lies in the interest of the shareholders of a firm we rather look at the market value of the equity than at the market value of the firm, as Tobin’s q suggests.

In (2) the independent variables are profitability, leverage, firm risk, cash flow risk, solvency and the square of the leverage. The latter is included to test for the nonlinear effect of debt on equity value.

To be sure that we control the effect of outliers in the model we use the natural logarithm of both the dependent and independent variables. We do this since we see that the variables in their “initial” form (i.e. as shown in Table 1) have skewed distributions and we need to transform them to a more normally distributed form<sup>9</sup>. This makes the interpretation of our results a little more complicated, as the coefficients of the independent variables is the elasticity of the dependent variable with regards to the independent variable, i.e. the effect of a one percent change in the independent variable. (Wooldridge, 2014)

To control for consistency in our models, we conduct regressions in three steps. The purpose of this is to see that we don't miss peculiar effects of adding further independent variables during the evolving in to our final models. We start with the main independent variable, that from theory grasps the essence of our two questions stated in the introduction and then go on with including more variables that we expect will increase explanatory power, and finally regress the whole model including all the explanatories we have chosen.

When modelling, we are put in situations where we need to be careful of a few things. These are: how to handle the two Gauss Markov Multiple Linear Regression assumptions regarding no heteroskedasticity and the zero conditional mean in the error term. Also, we need to handle the serial correlation, which our models contain. The tests for these issues are showed in the tables 3 and 4.

Regarding the first and the second we use cluster robust standard errors for our estimated coefficients. This will help us computing the “right” t-statistic (Wooldridge 2014) and p-value, which will increase our confidence in drawing conclusions from the estimates of our model. This leaves us with the handling of the last issue, the assumption of zero conditional mean in the error term.

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<sup>9</sup> See Appendix 3 och 4.

The assumption of the zero conditional mean in the error term states that with respect to any of the explanatory variables in a econometric model the error term is consistent over all independent variables over all time periods, i.e. the variables exhibit strict exogeneity. This implies that the error and the explanatory variables must be uncorrelated. In our regression results we see that our models face correlation between the error term and our explanatory variables, although it is pretty small in both regressions.

From this we conclude that the models to some extent violate the strict exogeneity assumption, meaning that the estimators are not the best linear unbiased estimators (Wooldridge, 2014). This means that among all linear unbiased estimators possible, the ones in our models to some extent don't exhibit the smallest variance attainable (Wooldridge, 2014). The obvious subsequent risk is that we get estimators that don't mirror the actual effects of the estimators in the underlying population.

#### **4. DATA**

Our sample contains of the firms in the Standard and Poor 500 index as of year 2014<sup>10</sup>. The observations are collected on January 15th each year between 2005 and 2014, besides the cash flow risk and firm risk which is observed every year preceding the observation date.

Since some data in our sample drops out because it was not reported in certain years we have studied, we have an unbalanced panel data set of 468 firms in the leverage model and 404 firms in the models for the shareholder value model. Also, since we are using the natural logarithm of the price-to-book and debt-to-equity as dependent variable, some firms with no leverage will also drop out from the sample. Table 1 and 2 shows explanations and summary statistics of the variables included in our models<sup>11</sup>.

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<sup>10</sup> CNN Money. (2014). "S&P500 Index". Cable News Network. Time Warner.  
<http://money.cnn.com/data/markets/sandp/?page=1>

<sup>11</sup> For further calculations of variables, see Appendix 6.

**Table 1 – Description of variables**

This table explains the notations of the variable in the regression models in this paper, which entities they are measured in, what they are called in everyday use, a short description of the variables and what the different variables measures.

Variable	Entity	Name	Description	Measures
pb	ratio	Price-to-Book ratio	The market price for the equity divided by the book value of the equity	Shareholder value
debtequity	ratio	Debt-to-Equity ratio	Total Debt divided by shareholder's equity	Leverage
roa	%	Return on assets	Net Income divided by total assets	Profitability
marketcap	Mill. \$	Market capitalization	Total value of outstanding equity	Firm size
std_return	%	Stand deviation in returns	Standard deviation in returns the year foregoing the observation date	Firm risk
intcov	%	Interest coverage	Earnings before interest and taxes divided by interest costs	Solvency
tangibility	%	Tangible assets to assets	Tangible assets divided by total assets	Tangibility
cf_std_proc	%	Standard deviation in free cash flow	Standard deviation of percentage deviations from the quarterly average free cash flow in a firm	Cash flow risk

**Table 2 - Summary Statistics**

This table of summary statistics displays the number of observations made, the mean, standard deviation, minimum, and maximum values of the different variables used in this paper. The data set includes 502 firms in the period 2005-2014.

Variables	Obs.	Mean	Std. Dev.	Min	Max
pb	4,476	4.483	20.58	0.099	773.9
debtequity	4,697	131.3	766.8	0	35,033
roa	4,694	6.944	7.565	-58.14	61.07
marketcap	4,649	25,731	44,866	181.3	497,483
std_return	4,066	34.76	19.47	11.56	198.6
intcov	3,573	65.78	716.0	-502.9	30,851
tangibility	4,530	78.95	20.35	9.291	100
cf_std_proc	4,765	370.1	3,980	1.097	237,458

## 5. RESULTS

### *Leverage model (1)*

Since the pecking order theory predicts that more profitable firms use less debt, (Myers, 1984), and the trade-off theory suggests the opposite (Fama and French, 2002), the result of testing for the effects of return on assets in our model is a crucial test of the two theories plausibility. We are interested in what effect return on assets has on the leverage ratio to draw a conclusion in favour of one of the two theories. Fama's and French's study found support for the pecking order theory.

Regarding other independent variables we expect a positive relationship to debt for tangible assets. From theory we see that tangible assets make good collateral and therefore should reduce the cost of debt (Rajan and Zingales, 1995). Firm size decrease the risk of default (Rajan and Zingales, 1995) and correlate with age and cost of seeking external capital (Fama and French, 2002), which implies that it would still have a positive correlation with debt. With larger firms being more investigated in detail by analysts, it seems plausible that increased firm size reduces the asymmetric information problem discussed in the pecking order theory.

Fama and French (2002) conclude that smaller firms have more asymmetric information and should therefore use more debt than equity, which would lead to more leverage for smaller firms. If firm size has a negative relationship with debt, it would support the pecking order theory. If the reverse result is reached, and since size has an inverse correlation with default, it would support the trade-off theory. Therefore this is the other important test for the two theories.

Large firms have more sources of cash flow and hence less volatile cash flow. Less volatile cash flow should lead to higher leverage predicted by both theories. We expect to have a negative relationship between cash flow risk and leverage. Even though several authors, including Fama and French, talk about cash flow variance and use firm size as proxy for this, we have not found another study that explicitly include a variable for this in the same way we do. As firm size also correlates with age and cost of external financing we include this variable. Doing this separates the effect of cash flows from firm size and shed light on the asymmetric information aspect of the latter.

For the measurement of another risk-aspect, the firm risk, we expect it to have a negative relationship to debt, since it increases the risk of financial distress, as predicted by the trade off theory.

**Table 3 – The factors that affects leverage**

This table reports the results from a stepwise fixed effects regression model on leverage. Model 1.1 uses one independent variable, 1.2 uses three independent variables and the final model 1.3 uses five independent variables. All coefficients are rounded to three decimals.

ln(leverage)	Model 1.1	Model 1.2	Model 1.3
ln(profitability)	-0.185*** (0.029)	-0.162*** (0.028)	-0.134*** (0.027)
ln(firm size)		-0.140** (0.061)	-0.192*** (0.061)
ln(firm risk)		-0.096** (0.039)	-0.109*** (0.041)
ln(tangibility)			-0.637*** (0.212)
ln(cash flow risk)			-0.000 (0.014)
Constant	4.204*** (0.048)	5.844*** (0.622)	9.088*** (1.270)
Observations	4,078	3,507	3,329
R <sup>2</sup>	0.019	0.025	0.034
Number of firms	487	479	468
Sargan-Hansen statistic (deciding between random and fixed effect regression)	H0: difference in coefficients is not systematic	S-H statistic: 98.994	Chi-sq(5) P-value = 0.000
Wald test for heteroskedasticity	H0: $\sigma(i)^2 =$	chi2 (468) = 2.1E+32	Prob > chi2 =

	$\sigma^2$ for all i	0.0000
Wooldridge test for autocorrelation	H0: no first-order autocorrelation	F(1, 402) = 10.992 Prob > F = 0.0010

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1) Robust standard errors in parentheses

2) \*\*\* indicates a p-value < 0.01, \*\* indicates a p-value < 0.05, \* indicates a p-value < 0.1

The results from the regression model on leverage are shown in table 3. With a negative sign on the coefficient for profitability, our result gives support to the pecking order theory. This is in line with that Fama and French (2002) obtained in their paper, and our result as well confirms the pecking order theory's stating that internal cash flows are preferred when it comes to financial decisions. This result is at conflict with the trade-off theory.

Firm size shows support of the pecking order theory since its sign is negative. Pecking order theory predicts that smaller firms use less debt, since the problem of asymmetric information should be larger. Firm size also correlates with age and the cost of seeking outside capital (Fama and French, 2002). The risk of the firm has a negative relationship with debt, also as expected. This is in line with the trade-off theory that predicts that when risk of default increases debt decreases. Regarding the other risk measurement variable, the cash flow risk, we don't see a remarkable effect departing from what we expected since it's negative but we don't have any significance so we won't discuss this further.

An unexpected result is the inverse relationship for tangibility to debt. We believe that this might be caused by a skewed distribution of the residuals, even after logarithmic transformation of the data for tangibility<sup>12</sup>. Other than the fact that this result goes against logic and theory, such a skewed distribution of the variable tangibility makes it plausible to say that this result is untrustworthy and that outliers in our sample to a large extent drive the distribution of the variable. Even though it's significant we won't go in to this further due to the problem just discussed.

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<sup>12</sup> See Appendix 5.

Looking at the economic effects of the significant variables in the model we see that a one percent increase in profitability has a 0.134 percent decrease in debt-to-equity ratio, which is rather small since a one percent change in profitability is quite an achievement. The economic effect of a one percent change in firm size is -0.192. Which is slightly bigger than the proxy for firm risk with an economic effect of -0.109. Tangibility and cash flow risk is either not trustworthy due to not non-normal distribution or not being statistically significant.

By adding more variables in model 1.3 we increase the  $R^2$ , regardless it is still low but we don't over-interpret it's magnitude since it, in a fixed effects model, mostly tells us how much of the time-varying effect that is explained by the independent variables (Wooldridge 2014). The economic effect from the regressors decreases as other variables are being added, but contributes with explanatory power - looking both at significance and the somewhat increase in  $R^2$ . When predicting the regression residuals we see that these exhibit little skewness, implying that the model follows a nearly normal distribution<sup>13</sup>. We see that the model is stable with respect to coefficient signs since these are constant during the stepwise regression ending up in the final model 1.3.

### Shareholder value model (2)

We expect leverage to have a positive but diminishing effect on shareholder value, as predicted by the trade-off theory. A firm that chooses to expose themselves to either too little or too much leverage is expected to have a lower equity valuation. This implies that we should see a positive sign on the coefficient for leverage and a negative sign on the coefficient for the squared leverage.

As for other variables, we expect profitability to have a positive effect on shareholder value since higher returns on asset has a higher economic value than a lower returning asset. We expect a negative coefficient for the cash flow variable. Higher variance of cash flow would mean higher risk since earnings are more erratic. The same goes for the risk in stock return of firms, which also is expected to have a negative effect on shareholder value.

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<sup>13</sup> See Appendix 3.

**Table 4 – The factors that affect shareholder value**

This table reports the results from a stepwise fixed effects regression model on shareholder value. Model 2.1 uses one independent variable, 2.2 uses three independent variables and the final model 2.3 uses six independent variables. All coefficients are rounded to three decimals.

ln(shareholder value)	Model 2.1	Model 2.2	Model 2.3
ln(leverage)	0.102*** (0.025)	0.127*** (0.028)	0.113*** (0.038)
ln(profitability)		0.162*** (0.017)	0.105*** (0.022)
ln(firm risk)		-0.310*** (0.019)	-0.297*** (0.024)
ln(solvency)			0.177*** (0.023)
ln(leverage) <sup>2</sup>			0.0311*** (0.007)
ln(cash flow risk)			-0.002 (0.008)
Constant	0.574*** (0.098)	1.270*** (0.139)	0.491** (0.190)
Observations	4,239	3,485	2,616
R <sup>2</sup>	0.030	0.198	0.322
Number of firms	486	477	404
Hausman test (deciding between random and fixed effect regression)	H0: difference in coefficients is not	chi2(6) = 138.02	Prob>chi2 = 0.0000

	systematic		
Wald test for heteroskedasticity	H0: $\sigma(i)^2 = \sigma^2$ for all i	chi2 (404) = 2.7E+32	Prob>chi2 = 0.0000
Wooldridge test for autocorrelation	H0: no first-order autocorrelation	F(1, 301) = 69.213	Prob > F = 0.0000

1) Robust standard errors in parentheses

2) \*\*\* indicates a p-value < 0.01, \*\* indicates a p-value < 0.05, \* indicates a p-value < 0.1

In table 4 we see that the effect of leverage on shareholder value is positive, the interpretation of this is that as one increase debt, one increase shareholder value. As the trade-off theory predicts, when a company applies too much debt the value of the firm goes down. When testing for nonlinear relationship of debt we also get a positive sign, which is remarkable and implies that the positive effect of debt is growing. This goes against the diminishing effect of leverage predicted by the trade-off theory. In the trade off theory from Kraus and Litzenberger (1973) they use the variable firm value (the total value of the debt and equity of the firm) where we are using the value of the equity. As the downside is limited for the equity and the upside is infinitive, one could argue that increased risk for the firm could have positive effects from a shareholder's perspective. We are however hesitant to believe that the firm should be awashed in debt. We believe that this would lead to higher cost of debt and that there is such a thing as too much debt.

Further looking into table 4 we see that profitability has a positive effect on shareholder value. Another expected result is the inverse relationship between shareholder value and firm risk. As firm risk increases, measured by the standard deviation of the stock return, the value of the equity goes down. Solvency is positively related with shareholder value, showing the obvious benefit of ability to cover interest costs also implies that the market values firms that exhibit positive earnings. Cash flow risk has a negative sign, congruent with our expectations but the result is not significant.

Regarding model stability we see that the coefficients differ slightly in magnitude but keep their signs during the stepwise regression process. Leverage and firm risk seem to be quite consistent through the exercise, while the effect of profitability decreases when we add more independent variables. The  $R^2$  measure makes a leap from 3% to about 20% going from model 2.1 to model 2.2 and ends up in model 2.3 on a level of about 32%. This tells us that including further explanatory variables has helped us explain shareholder value and the variables seem to provide strong explanatory power as they are included during the steps. The regression residuals are nearly normally distributed<sup>14</sup> which tells of a low presence of skewness in the model that is preferred when aiming at making conclusions from our result.

For purposes of economic effect of the variables, firm risk has the largest impact on shareholder value where a one percent change decrease shareholder value by 0.297 percent. Solvency has the second largest impact with a positive effect of 0.177 percent. An increase in leverage ratio by one percent would have a 0.113 percent effect on shareholder value. One percent increase in profitability would have a 0.105 percent increase on shareholder value. From this follows that a change in the firm risk, i.e. more present volatility in the stock return of the firm, is more negative for shareholder value than what the three latter is positive when looking at the individual effect.

## 6. CONCLUSION

From our results in section 5 we find that 1) The factors that affect a firm's capital structure are profitability, firm size and firm risk 2) A firm's leverage has a positive effect on shareholder value.

We make the conclusion that our results support the pecking order model regarding decision making about the firm's capital structure. The more profitable a firm is, the less debt it uses. Since Fama and French (2002) obtained the same effect for profitability with respect to shareholder value we are not surprised by this. The effect from firm size on leverage, the other big test of the conflicting theories, is also consistent with pecking order theory. Looking at the

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<sup>14</sup> See appendix 4.

effect on shareholder's value from the decision of leverage, we can see that market have valued equity higher when debt in firms has increased, which verifies that leverage has a positive effect on shareholder value.

When looking at the effect of firm size on leverage, we see that Rajan and Zingales (1995) had an opposite result in most of their regressions than ours. In one of the eight countries they looked at they got the same result as we did. In respect to the papers of Fama and French (2002) and Rajan and Zingales (1995) our result gives more weight to the pecking-order theory force of what determines capital structure decision. We find some support for the trade-off theory, for example seeing that further risk decreases the leverage ratio so we don't discard of the effects of this theory as a whole.

One question to consider is what happens to a succesful firm that generates profit. From our result we see that the effect is that leverage is lower and the shareholder value is higher. The lower leverage makes it plausible to think that firms finance themselves internally, which also is supported by pecking order theory. Still, further leverage also would benefit the shareholder value, implying that firms should take on more debt.

This brings to front an issue for the firm with the agency costs of free cash flow, as discussed by Jensen and Meckling (1976), and debt. Due to risk aversion, management in firms sometimes chooses to prioritize their own utility maximation over the best of the firm. This implies that shareholder value is lost in subjective decision-making. Bankruptcy, which risk is driven by further leverage, would be a more severe occurrence for the employees than for the owners, because the investors can diversify in multiple enterprises. However, testing for this is hard.

To sum up our effort, we achieve our goal to answer the two main questions of concern. We also make way for further discussion and investigation of the agency costs of free cash flow and corporate governance, a complex matter that seems to be far from solved. While testing we find, with exception of firm risk's effect on leverage, that most of our results speak for the forces of the pecking order model.

## 7. APPENDIX

### APPENDIX 1

This table reports the correlation between the variables used in the models.

	pxtobook	debtequity	roa	marketcap	std_return	cf_std_proc	intcov	tangibility
pxtobook	1.000							
debtequity	0.630	1.000						
roa	0.109	-0.049	1.000					
marketcap	0.013	-0.001	0.121	1.000				
std_return	-0.037	0.004	-0.173	-0.163	1.000			
cf_std_proc	-0.005	0.003	-0.048	-0.019	0.024	1.000		
intcov	0.010	-0.013	0.093	0.036	0.011	-0.006	1.000	
tangibility	-0.011	-0.005	0.005	0.024	0.135	0.046	0.041	1.000

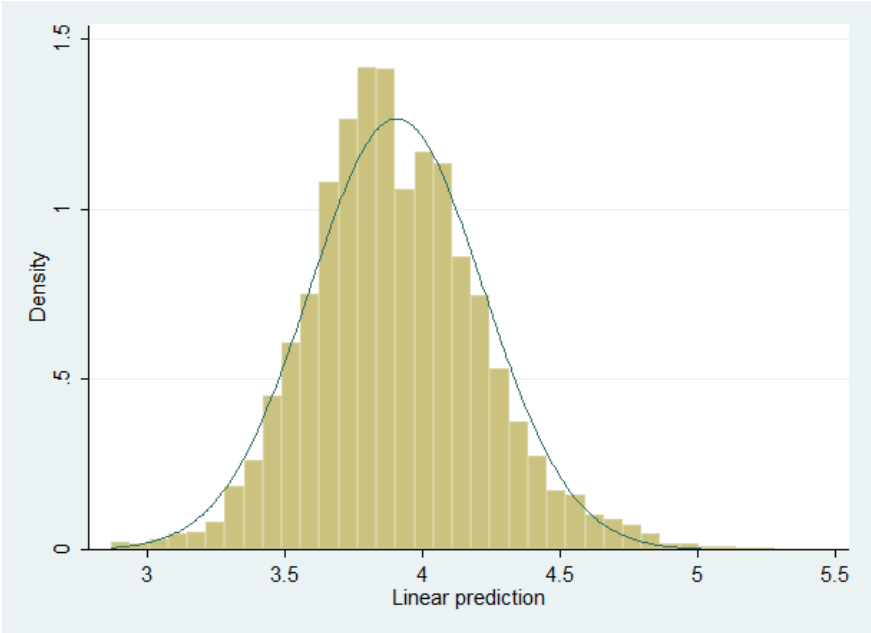
### APPENDIX 2

This table reports the correlation between the logarithms of variables used in the models.

	ln(de)	ln(pb)	ln(roa)	ln(mc)	ln(prisk)	ln(cfstd)	ln(ic)	ln(tang)
ln(de)	1.000							
ln(pb)	-0.003	1.000						
ln(roa)	-0.364	0.537	1.000					
ln(mc)	-0.022	0.102	0.058	1.000				
ln(prisk)	-0.079	-0.190	-0.071	-0.305	1.000			
ln(cfstd)	0.146	-0.154	-0.215	-0.179	0.058	1.000		
ln(ic)	-0.687	0.338	0.584	0.214	-0.002	-0.274	1.000	
ln(tang)	-0.007	-0.007	-0.084	0.005	0.107	0.196	0.027	1.000

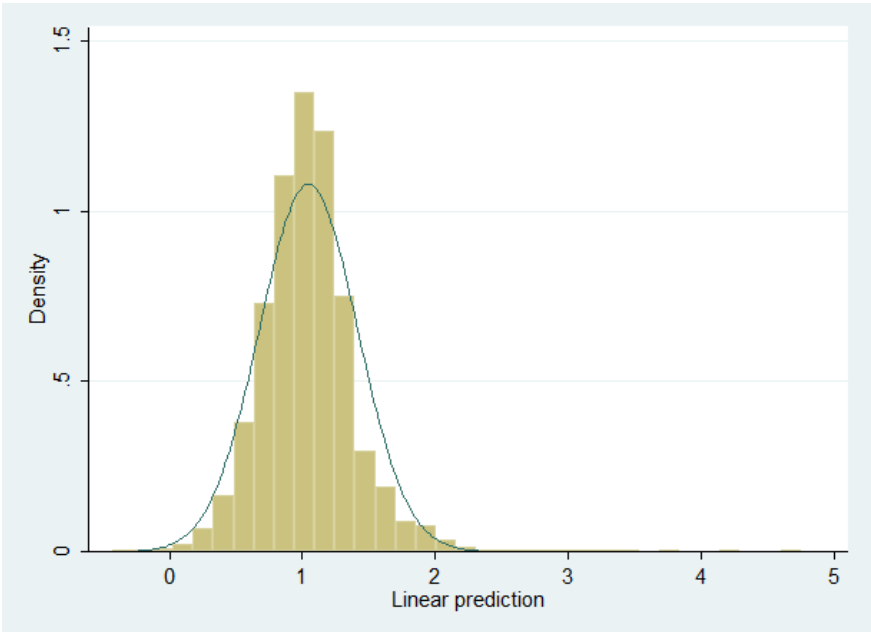
APPENDIX 3

Figure showing the density distribution of predicted residuals in model (1).



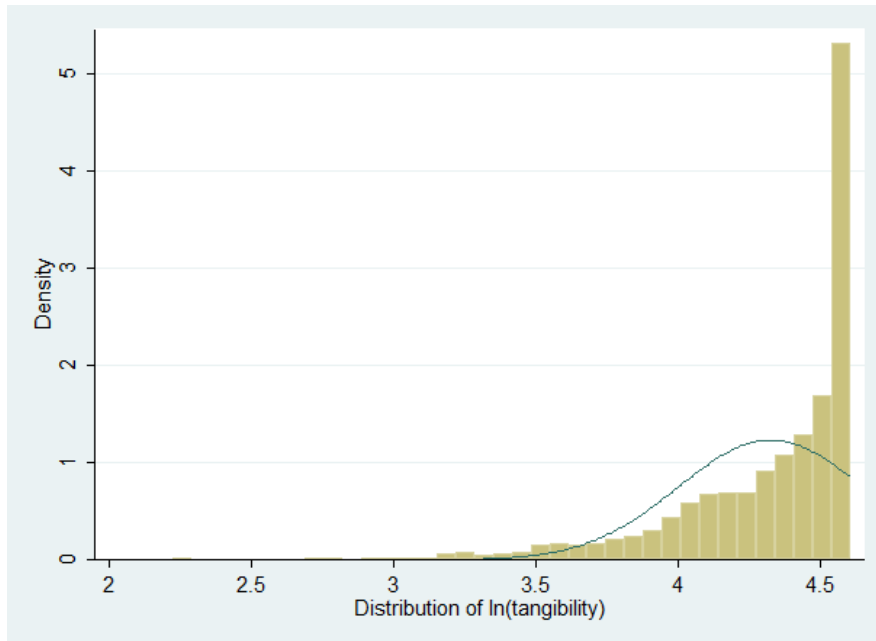
APPENDIX 4

Figure showing the density distribution of predicted residuals in model (2).



## APPENDIX 5

Figure showing the density distribution of ln(tangibility).



## APPENDIX 6

Our data is collected from Bloomberg Terminal. The observations for appendix 6.1-6.7 are collected on January 15th during the period 2005-2014. Firm risk is the daily standard deviation for the stock price for the companies during the previous year for the period 2005-2014, see appendix 6.6. Cash flow data is only available on a quarterly basis, we have calculated the standard deviation for the cash flow versus the average cash flow for that year over the years 2004-2013, see appendix 6.7.

$$6.1 \text{ Shareholder value} = \frac{\text{Market Capitalisation Equity}}{\text{Book Value Equity}}$$

$$6.2 \text{ Leverage} = \frac{\text{Total Debt}}{\text{Equity}}$$

$$6.3 \text{ Profitability} = \frac{\text{Net Income}}{\text{Total Assets}}$$

$$6.4 \text{ Tangibility} = \frac{\text{Tangible Assets}}{\text{Total Assets}}$$

$$6.5 \text{ Solvency} = \frac{\text{EBIT}}{\text{Interest Expense}}$$

6.6 Firm risk = trailing 365 days standard deviation, stock return

$$6.7 \text{ Cash flow risk} = \sqrt{\frac{1}{N} \sum \left( \frac{\text{CF}_{it}}{\text{CF}_t} - 1 \right) - \left( \frac{\sum \frac{\text{CF}_{it}}{\text{CF}_t}}{n} \right)}^2$$

*Risk in cash flow computed from the quarterly deviations from the quarterly average during one year in the period 2004-2013.*

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