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Capital Structure Determinants

A case study of the European Automotive Industry

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Abstract

The thesis examines what variables explain firms' choice of capital structure. The report centers around the automotive industry where Europe's largest automotive manufacturers are the framework for the report. Firms included in the thesis are BMW, Daimler, PSA and Volkswagen. By using a regression analysis we were able to measure how different variables correlate with the firm's leverage. Therefore, the statistical analysis enables the researcher to get a notion on what variables affect firm's capital structure choice. Variables that were considered as possible determinants of capital structure are size, growth potential, liquidity, asset tangibility and profitability. The time period during which the data was collected from is 2010 to 2019, the reason for this is to exclude as many potential externalities that would otherwise affect the result presented in the thesis. The study finds significant evidence, using a pooled OLS model and a fixed effects model, that profitability, asset tangibility and growth potential are negatively correlated with leverage. Considering the two explanatory theories for capital structure the report is unable to support any of the two theories as they explain almost equally many variables correlation with leverage.

Key words: Capital structure, Automotive Industry, Leverage Regressions, Trade-Off Theory, Pecking Order Theory, Determinants of Capital Structure

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1. Introduction

The automotive industry is an important part of the world economy as it is a large employer in many European countries, especially Germany where it provides circa 807,000 jobs (Saberi, 2018). The automotive industry is capital intensive but it also plays a major role in GDP growth of developed countries as it made up 10-14 percent of the GDP in South Korea, Germany, Japan and the USA in 2017 (ibid). According to Saberi (2018) the size of the automotive industry gives a levered effect on a country's GDP through subcontractors which further emphasizes the importance of the automotive industry. Moreover, Abor (2005) provides evidence that the profitability of a firm is affected by its capital structure and firms that choose to finance their operations mainly with debt are more profitable. The automotive industry could therefore be considered cyclically sensitive and strategies regarding capital structure are important to minimize the risk of financial distress. Considering how capital intensive the automotive industry is; a negative trend in the world economy could therefore be furthered if the profitability of the automotive industry is affected. An example of the volatile demand for cars can be seen in a report published by Collie et al. (2020), where it is shown that Europe's vehicle sales decreased by 46 percent from 2019 to 2020 as a result of the COVID-19 pandemic.

Thus, the stability of the automotive industry is important for the economy and therefore the entirety of society. Studying the capital structure or specifically the debt-to-asset ratio of firms operating in the automotive industry could provide insights that may be used to form future strategies that can be implemented during hard times to reduce the negative effects a decline in the automotive industry would have on the rest of the economy. However, Modigliani and Miller (1958) argue that capital structure does not affect firm value. Their assumptions have since then been criticized but more importantly, it sparked a discussion that eventually led to two rivaling theories; the Pecking Order Theory and the Trade-Off Theory.

The Pecking Order Theory explains that a firm will choose funds to finance its projects in a specific order as they want to exhaust other available options before issuing equity (Myers, 1984). The Trade-Off Theory, however, states that a firm should manage the benefits tax shields implies whilst taking the costs of financial distress into account (Kraus and Litzenbergers, 1973).

Considering the importance of the automotive industry and how it may affect the surrounding economy, we have chosen to study what affects the debt-to-asset ratio. This will be done through statistical analysis of key figures such as size, liquidity, growth potential, profitability and asset tangibility. This thesis will perform a regression analysis of data collected from BMW, Daimler, PSA and Volkswagen from 2010 to 2019.

1.1 Research question

The analysis will be focused on the correlation between debt levels and possible determinants of capital structure. The data is collected from European automotive manufacturer's annual reports over the period of 2010 to 2019. The span of 2010 to 2019 was chosen considering that a time period that spans longer may lead to the inclusion of externalities as a result of factors such as taxes, exchange rates, accounting standards and laws. Studying a time period as recent as 2010 to 2019 also increased the accessibility of data. The study will include four European automotive manufacturers, the reason to only include four manufacturers in the study is that it enables us to get a deeper and more accurate understanding of the chosen firm's capital structure. The four firms that were selected for the thesis are BMW, Daimler, Volkswagen and PSA. The reason for choosing these manufacturers is that they are the only European manufacturers that meet our criteria; these criteria are detailed in the limitations section. A further description of the selection process can be found in the Methodology section.

The research question that the report aims to answer is as follows:

- *What variables affect the capital structure of an automobile manufacturer operating in Europe?*

The following null hypotheses are constructed in order to examine what aspects have an effect on the debt-to-asset ratio of an automobile manufacturer:

1. H_0: Size does not have any effect on a firm′s leverage ratio
2. H_0: Profitability does not have any effect on a firm′s leverage ratio
3. H_0: Growth potential does not have any effect on a firm′s leverage ratio

4. H_0: Liquidity does not have any effect on a firm′s leverage ratio
5. H_0: Tangibility does not have any effect on a firm′s leverage ratio

The hypotheses will be tested using a pooled OLS regression model and a fixed effects model with dummy coded variables. A closer description of the models and variables can be found in the Methodology chapter. The panel data collected from the annual reporting of Volkswagen, PSA, Daimler and BMW will later be used to calculate the variables for the regression analysis.

1.2 Purpose

The purpose of the study is to contribute to the literature of capital structure field by putting forward evidence on what variables influence car manufacturer's choice of capital structure. The reason why the automotive industry was selected as the area of study is that the industry is of considerable importance for many countries as it's a big employer of the nation's workforce. The choice of the automotive industry is, in our opinion, logical considering the fact that the firm's capital structure choice affects the manufacturer's financial distress risk which is important considering that the demand for cars is volatile.

1.3 Limitations

Aspects that will be taken into consideration when selecting firms to be included in the study are industry, size, ownership of the firm, geographical location and M&A type of transactions that had a significant impact on the firm's capital structure. This limits the study to include four of Europe's largest car manufacturers. The reason for the fact that the study only includes these firms is that they were only ones that met the criteria. As there are drawbacks with only including four firms we hope that this will enable us to get a deeper understanding of the studied firms and thus a more accurate understanding of firm's capital structure choice. The scope for the study is limited to the period of 2010 to 2019. This means that the results and the conclusions drawn in the thesis needs to be viewed as a result of what the management considered important during this particular period, thus the results found could very well be different from those found in another time period. Still, the thesis gives an idea of what managers consider when deciding the firm's capital structure.

1.4 Thesis structure

Following the introductory section we will present previous research and the theories of capital structure and by doing this we hopefully give an understanding of the field. Thereafter the methodology will be presented; here we explain how the study was conducted. The chapter will include an explanation on why the chosen firms were selected but also a further description of the different variables. Thereafter the results will be presented by showing how the variables correlated with leverage. The results will be analyzed in closer detail in the results chapter. This will partly be done by comparing the findings with earlier research and how our findings correspond with the explanatory theories of capital structure. Following the results chapter, ideas for further research in the field and potential drawbacks with the research methodology will be presented in the discussion chapter. Lastly, the conclusion chapter will summarize what the thesis put forward.

2. Literature review

This chapter aims to give an understanding of previous research that has been done on the subject. This includes research that can be said to be the framework for research in the capital structure field. The section also includes previous studies of the automotive industry.

2.1 Previous research in capital structure

Ever since Modigliani and Miller (1958) first published their article on capital structure researchers have tried to see what affects firms' choice of capital structure. Today a significant share of the research published annually is where the old theories are tested and reviewed. Bradley (1984) has for example put forward extensive evidence for the Trade-Off theory and he concludes that to find the optimal combination of debt and equity the firm must balance the cons of costs of financial distress and the pros of non-debt tax shield.

Other researchers argue that the Pecking Order Theory is the most accurate theory to understand firms' view on capital structure. The theory was first put forward by Majluf and Myers (1984) as an alternative explanation to the Trade-Off Theory. Shyam-Sunder and Myers (1999) makes the case that the model is aligned with corporate finance behavior which has shown through high significant levels when the model was tested.

In a paper published by Graham and Harvey (2001) covering 392 CFOs the two authors conclude that a majority of large companies have target debt ratios. Thus indicates that a significant part of large firms have identified or thought that they identified an optimal leverage. Therefore, many researchers have published papers with the purpose of answering which variables the firm management considered when deciding what balance of equity and debt is the firm's optimal capital structure. A common method for answering this question is through a regression analysis with leverage as the dependent variable and potential explanatory metrics as independent variables. The regression analysis enables the researcher to measure to what degree different variables correlate with the firm's leverage and through this one can form an idea of which parameters had an impact when the management decided which leverage was the most optimal for the firm (Titman and Wessels, 1988).

One of the most cited articles which used this method and that made the method increasingly popular was Titman and Wessels (1988) paper where they studied how leverage corresponded with non-debt tax shield, growth, uniqueness, industry classification, size,

volatility and profitability. Many of the variables used in the article primary size, profitability and growth are variables that are common when possible capital structure determinants are studied. Titman and Wessels concluded that profitability is positively correlated with debt, on the other hand size is negatively correlated with leverage. Furthermore, their report cannot find a significant correlation between leverage and the independent variables future growth and collateral value of assets (asset tangibility). Thus, the paper provides evidence for both the Trade-Off Theory and the Pecking Order Theory.

Another much cited article that uses regression analysis to measure determinants correlation with leverage is Rajan and Zingales (1995). The study includes growth opportunities, asset tangibility, profitability and size as independent variables. They concluded that asset tangibility and size correlates positively with debt levels. They explain that a high portion of tangible assets enables firms to increase debt. Regarding the positive correlation between leverage and size the authors explain that large companies are more diversified. On the other hand profitability and growth opportunities are negatively correlated with debt. Their article can be said to be mostly in line with the Trade-Off Theory as three of the four variables correspond to leverage in a way that the Trade-Off Theory predicts that the variables should.

Another notion to consider in capital structure research is how the dependent variable is calculated. Some papers calculate leverage by taking the ratio of total liabilities and total assets whilst others calculate leverage by calculating the ratio of book value of debt and the sum of market value of equity and book value of debt, in other words the firm's market capitalization is used. Frank and Goyal (2009) studied if there was any difference between the two ways of calculating leverage and they concluded that there was not a significant difference.

A common trait in many articles is to test a mix of the traditional variables and more unconventional metrics as potential explanatory variables. Different metrics that researchers have tested are uniqueness of product, volatility, research and development expenditures, volatility and risk of bankruptcy (Harris and Raviv, 1991).

2.2 Capital structure determinants in the automotive industry

When it comes to the automotive industry, there is not much research that has been done to understand what influences managers' choice in the regard of capital structure in the automobile industry. A paper that tries to fill this void is Pinkovás (2012) paper *"Determinants of Capital Structure: Evidence from the Czech Automotive Industry''*. Pinková makes the case that size, tangibility, profitability and liquidity have a positive correlation with leverage. The only explanatory variable that is negatively correlated with leverage is tangibility whilst growth is the only variable that insignificantly correlates with debt levels.

Afza and Hussain (2011) "*Determinants of Capital Structure: A case study of Automobile Sector of Pakistan*" is another addition to the research in capital structure choice in the automotive sector. They looked at 26 firms in the Pakistan automotive sector and came to the conclusion that profitability and liquidity are negatively correlated with leverage. The variables that correspond positively with debt are cost of debt, size, non-debt tax shield, taxes and asset tangibility. One of the newest additions to research in the area of capital structure in the automotive industry is Bakardjiev (2018) paper "*Capital Structure Determinants within the Automotive Industry*". Unlike earlier papers Bakardjiev studied the European automotive industry. The paper puts forward evidence that profitability, non-debt tax shield and growth opportunities are negatively correlated with debt levels, on the other hand firm size and asset tangibility are positively correlated with debt.

Table 1:

Journal	**Size**	**Profitability**	**Growth Potential**	**Liquidity**	**Asset Tangibility**
Rajan and Zingales (1995)	+	-	*	*	+
Titman and Wessels (1988)	+/-	+	+	*	+/-
Afza and Hussain (2011)	+	-	-	-	+
Pinková (2012)	+	-	**	-	+
Bakardjiev (2018)	+	-	-	*	+

* Not included in report

** No correlation found

Source: Author's own elaboration.

3. Theoretical framework

This chapter aims to present the theories for which all research in the field of capital structure relies on. The purpose of presenting the theories is because it will be the base for which the chapters Empirical Results and Discussion build upon. The chapter is divided into three parts, starting with the Capital Irrelevance Theorem by Modigliani and Miller (1958), with the Pecking Order Theory to follow and ending with the Trade-Off Theory.

3.1 Capital Irrelevance Theorem

The framework for all research in the corporate finance field can be said to be Modigliani and Miller's (1958) "*The Cost of Capital, Corporate Finance and Theory of Investment*". In the paper Modigliani and Miller formulated two propositions, these are as follows (Berk and DeMarzo, 2020):

1. "*In a perfect capital market, the total value of firm's securities is equal to the market value of total cash flows generated by its assets and is not affected by its choice of capital structure*."
2. "*The cost of capital of levered equity increases with the firm's market value debt-equity ratio*."

The first theorem is the most famous and came to be known as Capital Structure Irrelevance Theorem and as the proposition points out the value of the firm is instead given by the market value of cash flows that the company will be generating. Thus a firm's value can be defined accordingly:

$$V^L = V^U$$

Where V^L is the value of a levered firm and V^U is the value of an unlevered firm. The theorem is however built upon a couple of assumptions, these are as follows (Berk and DeMarzo, 2020):

1. *"Investors can trade the same set of securities at competitive market prices equal to the present value of their future cash flows."*
2. *"There are no taxes, transaction costs, or issuance costs associated with security trading."*

3. *"A firm's financing decisions do not change the cash flows generated by its investments, nor do they reveal new information about them."*

An updated version of Modigliani and Millers paper published in 1961, explains that not only does capital structure have no effect on firm value but also dividend policy is irrelevant for investors. These conclusions have however withstood criticism as the assumptions made by Modigliani and Miller are not realistic. Thus it is important for firms to ask to what extent the condition in which they structure their capital corresponds to Modigliani and Miller's first proposition, and if these assumptions are very different from those in reality the proposition could be misleading.

3.2 Pecking Order Theory

The idea that there is a hierarchy among various financing options was first introduced by Donaldson (1961). But it was through Myers and Majluf (1984) that the idea of a specific order in which firms chooses to finance its operations originated. The Pecking Order Theory is built on the notion that in the real world there is asymmetric information between managers (agents) and shareholders (principles). Shareholders and the market are aware that managers have more knowledge of the firm's future performance as they are involved in the daily operations of the company. This information advantage on the hand of managers can be said to be the framework on which the Pecking Order Theory relies on. This awareness is important when the firm issues new debt and equity. Issuing equity will attract the attention of investors as it signals that the firm is not able to take on more debt, possibly being denied by lenders. This shows that the lenders believe that the risk of the firm not being able to pay back their loan is too high. The investors will therefore view the firm as overvalued as it does not yield the required return on the firm's projects.

Considering this reality Myers and Majluf presents a specific order in which the firm chooses to finance its operations. The order is accordingly:

1. Internal Financing → Retained earnings
2. External Financing → Debt
3. External Financing → Equity

According to the framework that Myers (1977) provides, it is possible to make different predictions on how this affects a firm's decisions regarding different aspects of capital structure choice. Myers comes to the conclusion that there is a negative relationship between growth opportunities, profitability and tangibility. On the other hand the firm's size will be positively correlated with leverage. Myers (ibid) explains that large companies often have a lower cost of debt as the asymmetric information problem is less common in large companies.

3.3 Trade-Off Theory

In 1963 and 1961 Modigliani and Miller reviewed and updated the paper that they first published in 1958. In the updated version from 1963 the two had come to realize that the value of the tax shield had been disregarded in the original paper. They came to the conclusion that companies could maximize the firm's value by only using debt to finance the firm's operations, thus maximizing the value of the tax shield. This conclusion was questioned by many researchers and Kraus and Litzenbergers (1973) criticism was the most influential. They argue that the assumptions made by Modigliani and Miller are not aligned with how things work in the real world. Above all Modigliani and Miller failed to take into account costs that arise due to financial distress which often occur when firms are highly levered. Therefore companies have to take both the benefit of tax shield and costs of financial distress into consideration to find the firm's optimal leverage. Thus a firm's value is given by:

$$V^L = V^U + PV(Interest\ Tax\ Shield) - PV(Financial\ Distress\ Costs)$$

The firm's understanding of capital structure is important to be able to create the highest possible value for shareholders. To find to what degree a firm should use debt to finance its operations they must take several things into account. There are three key factors that the firm should consider when determining the present value of financial distress costs (Berk and DeMarzo, 2020):

1. *Probability of financial distress.*
2. *The magnitude of costs if the firm is in distress.*
3. *The appropriate discount rate for distress costs.*

In other words a company with steady cash flows and a low risk regarding new projects has the ability to take on more debt than a firm with risky projects and unsteady cash flows as the firm financial distress risk is lower. This results in a larger tax shield which increases firm value.

4. Methodology

In this section, the models used to generate our results are presented and compared while discussing the credibility and fitness of our models. Thereafter; our dependent variable and independent variables are discussed in closer detail with a following description of the selection process for our chosen firms.

4.1 Model

For the analysis; the raw data for each firm was used to calculate the variable values in Excel. Once structured, the variables were then put in SPSS, which is a program used for statistical analysis, and a pooled OLS regression model was run first. Secondly, a fixed effects model using dummy coded variables was run. The difference between these models lies in a basic assumption of the data. The pooled OLS model assumes that there are no characteristics that are unique to the different firms in this case, whereas the fixed effect model does. The fixed effects model assumes that each firm has characteristics that do not vary over time. Thus, a dummy variable is assigned to each firm and the data that is associated with it, to ensure that the model is able to capture these characteristics. As seen in the figures below; the residuals of the used models are not perfectly normally distributed but the fixed effects model seems to follow the bell curve better. The impact of this may be that the fixed effects model will provide more accurate results.

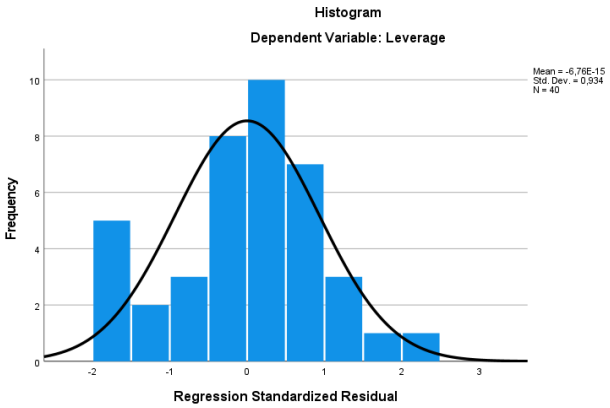

Fig. 1 - Pooled OLS model.

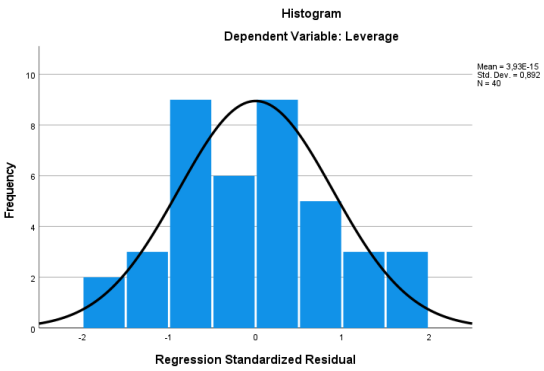

Fig. 2 - Fixed effects model.

Considering the use of panel data, our sample size of ten for each of the four firms, we ended up with 40 samples for each variable. According to Kwak and Kim (2017), the lower limit for data sets to be considered normally distributed is 30 as the Central Limit Theorem starts becoming applicable. However, signs of heteroscedasticity are showing which may imply that there is multicollinearity present in the data set. As seen in the figures below, the fixed

effects model (fig. 4) produces residuals that are more spread and random than the pooled OLS model (fig. 3), yet it is showing minor tendencies of heteroscedasticity.

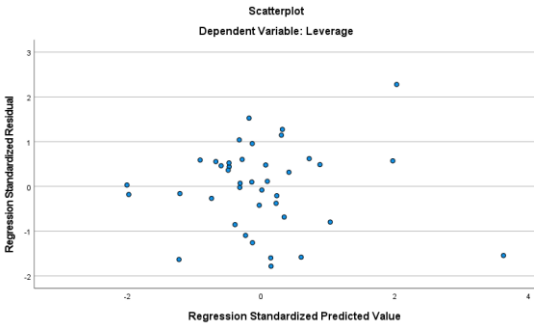

Fig. 3 - Pooled OLS model.

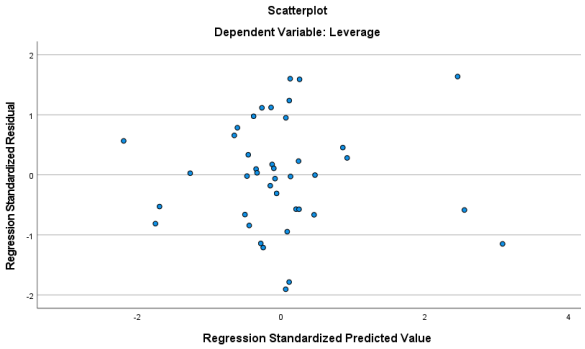

Fig. 4 - Fixed effects model.

4.2 Regression analysis

The models used for analysis resulted in slightly different Durbin-Watson statistics where the pooled OLS model (1,215) was lower than the fixed effects model (1,305) and thus indicates that there may be some autocorrelation present. The fixed effects model (fig. 6) also provided more accurate predictions as seen when comparing the line of best fit in to the pooled OLS model (fig. 5) in the figures below, thus making the results it provides more trustworthy. Furthermore, the pooled OLS model resulted in a lower (0,716) R-squared than the fixed effects model (0,803) but on the other hand, the pooled OLS model resulted in a higher (17,169) F-value where the fixed effects model resulted in an F-value at 15,765.

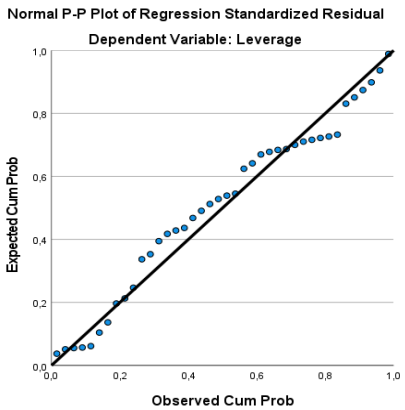

Fig. 5 - Pooled OLS model.

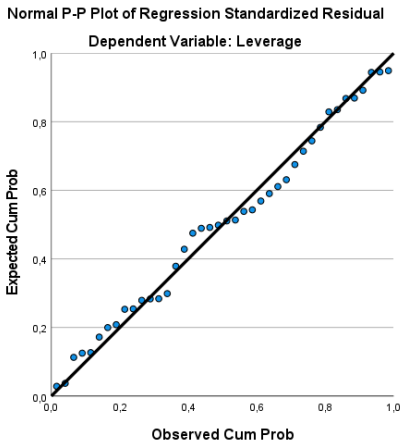

Fig. 6 - Fixed effects model.

The equation used for both our models before re-coding consisted of beta values that determine the degree of which the corresponding variable affects the outcome and our five variables. The equation used can be seen below where *PROF* represents profitability, *TANG* represents tangibility, *GROW* represents growth potential and *LIQ* represents liquidity.

$$\hat{y} = \alpha + \beta_1 SIZE + \beta_2 PROF + \beta_3 TANG + \beta_4 GROW + \beta_5 LIQ$$

4.2.1 Dependent Variable

A majority of the papers that use regression analysis to determine what variables affect capital structure choose leverage as the dependent variable. Total debt ratio or leverage as it is often referred to is the ratio between total liabilities and total assets, where total liabilities is in the numerator and total assets is in the denominator. The data needed to calculate this ratio is collected from the firm's annual report where the majority is from the firm's balance sheet, thus the values that the regression analysis builds upon are the figures that the companies report and not what market estimates the firm's assets to be worth. Another way to measure the total assets is that of its market capitalization and adding the firm's debt. This way of calculating leverage is used by Titman and Wessels (1988) and Rajan and Zingales (1995). The reason why we choose to go with book value of total assets instead of market capitalization is that security markets can be very volatile and as a result of this, the data collected can be considerably different from that data that would be collected if the collection was done just a couple of weeks or even days earlier. Therefore the conclusions made could be very different from those conclusions that would be taken if the data would be collected a couple of weeks earlier. When it comes to book value the figures do not change that much thus the results presented in the report should be more reliable. This approach to calculate leverage is used by Bakardjiev (2018).

4.2.2 Independent Variables

4.2.2.1 Size

Firm Size is an important factor to consider in capital structure choice. Titman and Wessels (1988) makes the case that large firms often become more diversified. This diversification means that the company becomes less dependent on a specific market or business unit as there are others the firm can rely on if one performs badly. On the other hand, Rajan and

Zingales (1995) comes to another conclusion. They argue that occurrence of asymmetric information is less prevalent among large companies. Therefore a negative correlation between size and leverage can be expected. In the report, firm size will be calculated by taking the natural logarithm of the reported revenue. Other studies such as Titman and Wessels (1988) use the natural logarithm of sales to calculate firm size. The reason for choosing revenue is that it takes into account all cash flows generated by the firm assets while sales do not. Thus, cash flow generated by the firm's assets is included in total assets and they would have to be subtracted as total assets are used to calculate other variables.

4.2.2.2 Profitability

Profitability is an important factor when the firm's management decides what balance of equity and debt is the most optimal. The ratio is also important for the company's stakeholders, especially shareholders as it shows the company's ability to create value for customers. Again, the definition that will be used in the report is the one used by Titman and Wessels (1988) where the ratio is calculated by dividing operating income with total assets. Myers (1984), who can be said to be the founder of the Pecking Order Theory, argues that as profitability increases, the company's retained earnings increase and therefore the firm's need for external financing decreases. It is important to note that this argument is built on the assumption that the dividend is unaltered. On the other hand the Trade-Off Theory gives another explanation. According to the Trade-Off Theory high profitability levels means that the firm is able to take on more debt and considering that an increase in debt means an increase in interest expenses; the firm's tax shield also increases which is preferable from security holders perspectives. Thus a positive correlation between debt levels and profitability can be expected.

4.2.2.3 Growth Potential

Growth potential is a variable that aims to measure the company's ability to increase operations in the future. Thus it is a relevant variable as it gives managers an idea on what they can expect in the future and through this decide the optimal capital structure. This study uses the ratio of intangible assets and total assets. This definition of the growth potential is used by Titman and Wessels (1988). Companies with a high potential for growth often have a higher project risk and thus a higher risk of financial distress. Taking this into account a logical conclusion considering the Trade-Off Theory is that these firms will use a higher

share of equity and therefore a negative relationship between debt and growth potential can be expected.

4.2.2.4 Liquidity

Liquidity is a good indicator for financial distress. As liquidity shows the firm's ability to pay off debt, it is an important component when analyzing the company's financial strength. Since liquidity is an indicator of financial strength one may expect that this enables the firm to take on more debt thus increasing leverage and therefore a positive correlation between debt levels and liquidity can be expected. However, this conclusion stands in contrast to some papers that come to the opposite conclusion. Mazur (2007) is one of the researchers which come to the conclusion that there is a negative relationship between debt levels and liquidity. The definition used in this article is the ratio between current assets and current liabilities, this definition is also used by Afza and Hussain (2011) and Pinková (2012).

4.2.2.5 Asset tangibility

Asset tangibility is one of the most important variables to consider when deciding the optimal balance of debt and equity. Tangible assets are often used as collateral for lenders as they are good protection for lenders in case the firm defaults on its payments. The Trade-Off Theory assumes a positive relationship between leverage and asset tangibility. The reason for this is that a large portion of tangible assets enables the firm to take on more debt as the lenders will see the loan as secure since the tangible assets can be more easily converted into liquidity. A paper that supports this conclusion is Titman and Wessels (1988). This conclusion is however in opposition to that of the one that can be drawn from the Pecking Order Theory, which explains that information asymmetry is less occurring for firms with a high portion of tangible assets thus making equity financing preferable. This study will use the ratio between PP&E (Property, Plants and Equipment) and total assets, where PP&E is in the numerator and total assets in the denominator. This definition to calculate asset tangibility is supported by Bakardjiev (2018).

4.3 Selection process for the chosen companies

The selection process of the chosen companies was done accordingly:

1. The company must be of a considerable size. Small manufacturers will be excluded as their choice of capital structure may not be as thought through as for large automakers

with a long history in the industry. The reason for this is to ensure that the company's internal processes in the regard of capital structure are professional and worked through. Thus companies such as Ferrari, Tesla, Aston Martin and McLaren will be excluded.

2. To ensure that the analysis is accurate and to reduce risk of externalities such as effects of taxes, laws, currencies and accounting standards. We have decided that the chosen automotive manufacturers should have their headquarter and main operations in the same region. Since Europe has been a driving force in the automotive industry for a long time we have decided that the European automakers is the best option for choosing companies that will be included in the report. Thus, automakers such as General Motors, Toyota, Honda and Hyundai will be excluded.
3. Automakers that are a subsidiary to another automotive manufacturer will not be included in the report as the subsidiaries choice of capital structure could be affected by the other subsidiaries or the parent company's capital structure. Therefore only the parent company with all companies included in the report will be chosen for the study. The criteria rules out automakers such as Audi, Skoda, Volvo and Range Rover.
4. Automakers that have gone through a merger, a major acquisition or an alliance during the time that the data was collected will be excluded from the report. The reason for this is that the company would be very different from that company that it was in the beginning of the period from that in the end, thus the company's balance sheet would be very different which would make a comparison in some aspects meaningless as it is two very different companies. The reason why automakers that are or have been part of an alliance will be excluded is for the overall risk and therefore balance of debt and equity may be affected as the firm's financial distress risk could be significantly lower as a result of the alliance. These criteria rules out manufacturers such as Renault, FCA and Mitsubishi.

5. Data

The data section begins with a table which presents each variable. It shows how each variable is calculated and how our two main theories expect it will affect the dependent variable. Following this; there is a description of the chosen firms that includes some background information.

5.1 Collected data and variable calculations

The quantitative data collected for the analysis is sourced from each of the individual firm's annual reports over the period 2010 to 2019. The four firms are large automotive manufacturers operating in Europe but are competing globally. The table below describes how each variable is calculated and what the effect on leverage our two main theories expects them to have. The raw data can be found in Appendix 1 along with the variables for each firm and year. The independent variables chosen for the analysis are size, profitability, growth potential, liquidity and asset tangibility. For the chosen dependent variable, leverage, a proxy consisting of liabilities as a share of total assets is used.

Table 2: *Source: Author's own elaboration.*

Independent Variable	**Measured By**	**Theory**	**Expected Effect**
Size	Ln(Revenue)	Trade-off Theory Pecking Order Theory	+ -
Profitability	EBIT / Total Assets	Trade-off Theory Pecking Order Theory	+ -
Growth Potential	Intangible Assets / Total Assets	Trade-off Theory Pecking Order Theory	- +
Liquidity	Current Liabilities / Current Assets	Trade-off Theory Pecking Order	+ -
Asset Tangibility	PP&E / Total Assets	Trade-off Theory Pecking Order Theory	+ -
Leverage	Total Liabilities / Total Assets	-	

5.2 Description of the chosen automotive manufacturers

After considering the criteria above; only four automotive manufacturers meets the requirements. Further information regarding key figures can be found in Appendix 1; Variables. The selected companies are as follows:

5.2.1 BMW

BMW was founded in 1916 in Germany. The company soon came to be one of the leading automotive manufacturers in Germany. Today, BMW has over 31 production plants and over 126 thousand employees. In 2019, the automaker sold 2,5 million cars worldwide resulting in a revenue of 104 billion euros with motorcycle sales included. With brands such as BMW, Rolls-Royce and MINI the group brands are well known. The group is listed on the German stock exchange with the Quant family as the largest shareholder (BMW Group, 2020).

5.2.2 Daimler

Daimler's origins can be traced back to 1885 when Karl Benz built the first automobile. Today, the group produces not only cars but also trucks, vans and buses. Brands owned by the Daimler Group include Mercedes-Benz, Maybach, Smart, Freightliner, Fuso and Bharat Benz. In 2019, Daimler sold 3,34 million cars and the group had a turnover of 173 billion euro, today the group has over 291 thousand employees. The company's stock is listed on the German stock exchange (Daimler, 2020).

5.2.3 PSA

PSA manufactures cars under the DS, Peugeot, Opel, Vauxhall and Citroen brands. The company was one of the first companies worldwide to start producing cars. The company was created through the merge of Peugeot and Citroen in 1976. Today, PSA produces over 3,5 million cars resulting in a revenue of 74,7 billion euro. The company employs over 209 thousand and is currently listed on the French stock exchange (PSA, 2020).

5.2.4 Volkswagen

Volkswagen was founded in Germany in 1934 and has grown to become the world's largest automotive manufacturer with an annual production of 10,97 million cars in 2019, resulting in 252,6 billion euro in revenue. Volkswagen has over 671 thousand employees globally with

a total of 125 production facilities. The group also manufacturers trucks, buses, vans and motorcycles. Brands included in the group are Skoda, Audi, Lamborghini, Volkswagen, Bugatti, Seat, Porsche, Scania, MAN, Ducati and Bentley. Volkswagen is listed on the German stock exchange with Porsche Holding as the largest shareholder (Volkswagen AG, 2020).

6. Empirical Results

In the following section; we are going to present the results from our two statistical models after running them in SPSS. We will also compare our results with previous research and literature. The table below shows a summary of the significance levels and the correlation found between the independent variables and leverage, as well as the established theory which explain the result. To reject a null hypothesis, the variable needs to have a significance level lower; or equal to 0,05. After that, we discuss each variable separately.

Table 3:

Explanatory Variable	**Pooled OLS Significance Level**	**Fixed Effects Significance Level**	**Correlation with Leverage**	**Explanatory Theory**
Size	0,702	0,300	-0,196	Pecking Order Theory
Profitability	0,000	0,001	-0,714	Pecking Order Theory
Growth Potential	0,046	0,211	-0,315	Trade Off Theory
Liquidity	0,148	0,417	0,145	Trade Off Theory
Asset Tangibility	0,655	0,002	-0,100	Pecking Order Theory

Source: Author's own elaboration.

6.1 Size

Using the pooled OLS model and fixed effects model, we were unable to reject the null hypothesis that size does not have any effect on a firm's leverage ratio as it resulted in a significance level of 0,702 and 0,300. We are thus unable to find statistically significant evidence for that size has an effect on a firm's leverage. However, the correlation between

leverage and size is negative (-0,196), thus the findings in this report are, although not significantly, aligned with what the Pecking Order Theory predicts. This is a quite strong negative correlation and Rajan and Zingales (1995) provides a potential answer for these results, the two argue that the occurrence of asymmetric information becomes more common as the firm diversifies. In other words as firms become larger and more diversified it becomes harder to do estimations on the firm's future performance as there is not enough information to build the predictions on. This shortage of information means that lenders have a hard time deciding what interest rate to require from their loan as it is hard to estimate the firms' ability to pay off debt. This may result in a higher premium as lenders will consider the firm more risky. Furthermore, increasing debt means an increase in the firms' cost of debt and as a result the firm will prefer retained earnings to finance its' operations.

6.2 Profitability

Both our models were able to reject the null hypothesis that profitability does not have any effect on a firm's leverage ratio. We can thereby state that we found statistically significant evidence that profitability does have an effect on a firm's leverage ratio and that they have a negative relationship (-0,714). This indicates that the more profitable the company becomes the less likely it is that the firm's leverage will increase. This is in direct opposition to the Trade-Off Theory and thus aligns with the Pecking Order Theory. The explanation that Myers (1984) gives is as the firm's profitability increases the company's need for external financing decreases as the retained earnings increases. This explanation assumes that the firm's dividend is the same and does not increase with the firm's increased profit. The negative relationship shows that firms prioritize the benefit a large tax shield implies. Our result is in line with Bakardjiev (2018) and Afza and Hussain (2011), but in opposition to Pinková (2012). Considering the automotive industry's need for liquidity to finance the transformation from combustion engines to electrified ones, and disinclination for equity issues a logical conclusion is that debt issuing and retained earnings are preferable.

6.3 Growth Potential

When it comes to growth potential, our models differ. Both show a negative relationship with leverage (-0,315), which the Trade-Off Theory is able to predict. However, the pooled OLS model is able to reject the null hypothesis that growth potential does not have any effect on

the firm's leverage, but the fixed effects model is not. The negative relationship could be explained by risk. Companies with higher growth potential often have a higher financial distress risk which increases the cost of debt as lenders want to compensate the distress risk with a high interest rate (Bakardjiev, 2018). Thus it becomes expensive for the firm to hold debt and instead they choose a higher share of equity to finance its operations.

6.4 Liquidity

Both our models fail to reject the null hypothesis that liquidity does not have any effect on a firm's leverage and we found a positive correlation (0,145). We are therefore unable to say that there is statistically significant evidence that liquidity has an effect on a firm's leverage. According to the Trade-Off Theory, liquidity is a sign of a company's financial strength. As lenders consider the financial distress risk as low due to the strong financial position, the interest rate that the lenders require will be favorable (Pinková 2012). Thus the company prefers debt financing instead of relying on retained earnings and equity financing. Another potential reason for the positive relationship between liquidity and leverage is the fact that an increase in debt leads to an increase in tax shield which is beneficial for the firm. The positive relationship is in opposition to the results found in papers published by Pinková (2012) and Afza and Hussain (2011) that also studied the automotive industry.

6.5 Asset Tangibility

Using the pooled OLS model we were unable to reject the null hypothesis that tangibility does not have any effect on a firm's leverage but with the fixed effects model we were able to reject the null hypothesis. We did, however, find a negative correlation in both cases (-0,100). This relationship can be explained by the Pecking Order Theory which argues that a higher portion of tangible assets leads to less asymmetric information and thus the firm chooses not to increase debt levels (Pinková, 2012). A majority of the papers that studies asset tangibility correlation with leverage comes to the conclusion that there is a positive correlation. One study that to some degree opposes this view and thus aligns with this report's result is Titman and Wessels (1988) paper where they cannot conclude how asset tangibility correlates with debt levels. The reason that is often given regarding asset tangibility and why it should correlate positively with debt is that tangible assets could be used as collateral for lenders as it protects them from potential losses.

7. Discussion

The study aimed to answer what variables affect automotive manufacturer's choice of capital structure. By using a regression analysis we were able to come to the conclusion that growth potential, profitability, size and asset tangibility are negatively correlated with leverage. Only liquidity is positively correlated with leverage. It is however important to note that only profitability was found to have a statistically significant correlation using both models, growth potential using the pooled OLS model and asset tangibility using the fixed effects model. Considering this, the report's results are to some degree in line with what earlier papers put forward (Pinková, 2012).

A possible suggestion for further research would be to look at what other manufacturers in the automotive industry take into consideration when they choose what capital structure is the most optimal for them, and how this aligns with the two explanatory theories of capital structure. As the study only considers the largest automotive manufacturers it would be interesting to study how this corresponds with smaller manufacturers in the industry, another interesting aspect to study would be the potential effects of the firm's geographical location. This could be even more relevant as there are differences in important factors such as tax rates, laws, accounting standards and interest rates since these factors have an impact on distress risk and tax shield they most certainly would affect the firm's optimal debt-to-asset ratio. Another suggestion for further research in the field of capital structure is to study how firms structures their debt, in other words what portion of the debt is short term and long term. The thesis is unable to give an in-depth explanation for how managers think in terms of capital structure and their view on the firm's financial distress risk and how this affects the firm in terms of loan agreements. Thus, an interview may provide insights that would increase the accuracy of our study.

The automotive industry is currently going through a major transformation from combustion engines to more environmentally friendly fuel alternatives and battery driven vehicles. The transformation could have effects on the firm's balance sheet thus affecting the firm's choice of capital structure. Thus, a potential future research question could be: how does the development and ever increasing competition in the automotive industry affect manager's view on capital structure?

8. Conclusion

What affects managers' choice of capital structure has been studied since Modigliani and Miller (1958) first published their article. This thesis aims to answer this question through a regression analysis where potential explanatory variables for capital structure are independent variables and leverage is the dependent variable. The metrics that are considered as explanatory variables are size, liquidity, asset tangibility, profitability and growth potential. These metrics were selected as they are broadly considered as variables that affect capital structure choice (Afza and Hussain, 2011). The regression analysis put forward evidence that size, profitability, asset tangibility and growth potential correlates negatively with leverage, on the other hand only liquidity corresponds positively with leverage. The variables that can be considered correlated with leverage in a significant way, using the fixed effects model, are profitability and asset tangibility. The pooled OLS model is however, able to find significant correlations between leverage and profitability and growth potential. As concluded in the methodology chapter, though, the fixed effects model is shown to be more accurate than the pooled OLS model.

Over time, as research in the field of capital structure increased, two rivaling theories emerged: the Pecking Order Theory and the Trade-Off Theory. The two theories give two different frameworks regarding how firms finance its operations. This extends to explaining how different variables correlate with leverage. Considering the results found in the study; profitability, size and asset tangibility correlated in a way that the Pecking Order Theory predicts. On the other hand growth potential and liquidity correlated in a way that the Trade-Off Theory predicts. Thus, neither theory is able to outmatch the other in the regard of explaining variables' correlation with leverage. The Pecking Order Theory has a slight advantage as the theory aligns with three variables compared to the Trade-Off Theory which is able to explain two variables. Considering this; we draw the conclusion that both theories are able to some extent explain managers' choice of capital structure.

List of references

Abor, Joshua. 2005. The effect of capital structure on profitability: An empirical analysis of listed firms in Ghana. *The Journal of Risk Finance* 6:438-445. Doi: 10.1108/15265940510633505

Afza, Talat & Hussain, Amer. 2011. *Determinants of Capital Structure: A Case Study of Automobile Sector of Pakistan.* Interdisciplinary Journal of Contemporary Research in Business 2(10).

Bakardjiev, Nicolai. 2018. *Capital Structure Determinants within the Automotive Industry*. Lund. Department of Economics: Lund University.

Berk, Jonathan & DeMarzo, Peter. 2017. Corporate Finance. Pearson, 529, 600.

BMW. N/A. *BMW Group Key Figures.* Available: https://www.bmwgroup.com/en/company.html (10/01-21)

Bradley, Michael: Jarrell, Gregg: Kim, Han. 1984. *On the Existence of an Optimal Capital Structure: Theory and Evidence.* Journal of Finance. 857-878.

Collie, Brian: Kirn, Raphael: Krebs, Kristina: Waas, Alexander: Wachtmeister, Alexander: Quresh, Hamza . 2020. *Automotive demand post COVID-19.* Boston Consulting Group. https://image-src.bcg.com/Images/Auto%20post%20COVID-19_052920_tcm9-249607.pdf (05/01-21)

Daimler. N/A. *Current Group Key Figures.*Available: https://www.daimler.com/investors/key-figures/prior-year/group/ (09/01-21)

Donaldson, Gordon. 1961. Corporate debt capacity; a study of corporate debt policy and the determination of corporate debt capacity. Boston: Harvard University.

Frank, Murray & Goyal, Vidhan. 2009. *Capital Structure Decisions: Which Factors Are Reliably Important?* Financial Management 38(1).

Graham, John & Harvey, Campbell. 2001. *The theory and practice of corporate finance: evidence from the field.* Journal of Financial Economics 60(2-3): 187-243.

Harris, Milton & Raviv, Artur. 1991. *The Theory of Capital Structure*. The Journal of Finance 46(1).

Kraus, Alan & Litzenberger. Robert. 1976. *A State-Preference Model of Optimal Financial Leverage.* The Journal of Finance 28(4): 911-922.

Kwak, Sang & Kim, Jong. 2017. *Central limit theorem: the cornerstone of modern statistics.* Korean Journal of Anesthesiol. 2:144-156. Doi: 10.4097/kjae.2017.70.2.144

Mazur, Kinga. 2007. *The Determinants of Capital Structure Choice: Evidence from Polish Companies.* International Advances in Economic Research 13: 495-514.

Modigliani, Franco & Miller, Merton. 1958. *The cost of capital, corporation and the theory of Investment.* The American Economic Review, 48(3): 261-297.

Modigliani, Franco & Miller, Merton. 1961. *Dividend Policy, Growth, and the Valuation Of Shares.* The journal of Business, 34(4):411-411.

Myers, Stewart. 1977. *Determinants of corporate borrowing.* Journal of Financial Economics, 5(2): 147-175.

Myers, Stewart & Majluf Nicholas. 1984. *Corporate financing and investment decisions when firms have information that investors do not have.* Journal of Financial Economics 13(2): 187-221.

Pinková, Pavlína. 2012. *Determinants of capital structure: evidence from the Czech automotive industry.* Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis.

PSA. N/A. Key figures Groupe PSA in 2019. Available: https://www.groupe-psa.com/en/automotive-group/key-figures/ (09/01-21)

Rajan, Raghuram & Zingales, Luigi. 1995. *What Do We Know about Capital Structure? Some Evidence from International Data.* The Journal of Finance 50(5).

Saberi, Behzad. 2018. The role of the automobile industry in the economy of developed countries. *International Robotics & Automation Journal* 4(3): 179-180. Doi: 10.15406/iratj.2018.04.00119

SCB. 2020. *Exports to our 30 largest trade partners*. https://www.scb.se/en/finding-statistics/statistics-by-subject-area/trade-in-goods-and-services/foreign-trade/foreign-trade---exports-and-imports-of-goods/pong/tables-and-graphs/exports-to-our-30-largest-trade-partners/ (05/01-21)

Shyam-Sunder, Lakshmi & Myers, Stewart. 1999. *Testing static tradeoff against pecking order models of capital structure.* Journal of Financial Economics 51(2): 219-244.

Titman, Sheridan & Wessels, Roberto. 1988. *The Determinants of Capital Structure Choice.* The Journal of Finance 43(1): 1-19.

Volkswagen. N/A. *Portrait & Production Plants.* Available: https://www.volkswagenag.com/en/group/portrait-and-production-plants.html# (09/01-21)

Volvo Cars, N/A. *Volvo Cars kontor och fabriker i Sverige.* Available: https://www.volvocars.com/se/om-volvo/foretaget/karriar/kontor-och-fabriker (10/01-21)

APPENDIX 1

Raw Data

Source: Annual report of the respective firm

BMW	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Revenue	60,477	68,821	76,848	76,058	80,401	92,175	94,163	98,678	97,48	104,21
EBIT	5,094	8,018	8,3	7,986	9,118	9,593	9,386	9,88	9,121	7,411
PP&E	11,427	11,685	13,341	15,113	17,182	17,759	17,96	18,471	19,801	23,245
Intangible Assets	5,031	5,238	5,207	6,179	6,499	7,372	8,157	9,464	10,971	11,729
Total Current Liabilities	40,134	47,213	48,431	50,043	59,078	65,591	67,989	69,047	70,909	82,625
Total Assets	108,857	123,429	131,85	138,368	154,803	172,174	188,535	193,483	208,98	228,034
Total Current Assets	43,151	49,004	50,514	52,174	56,844	61,831	66,854	71,582	83,538	90,63
Total Liabilities	85,767	96,326	101,448	102,725	117,366	129,41	141,172	138,935	150,892	168,127
Daimler	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Revenue	97,761	106,54	114,297	117,982	129,872	149,467	153,261	164,33	167,362	172,745
EBIT	7,274	8,755	8,615	10,815	10,752	13,186	12,902	14,682	11,132	4,329
PP&E	17,593	19,18	20,599	21,779	23,182	24,322	26,381	27,981	30,948	37,143
Intangible Assets	7,504	8,259	8,885	9,388	9,367	10,069	12,098	13,735	14,801	15,978
Total Current Liabilities	53,139	54,855	58,718	59,108	66,974	77,081	84,457	87,105	97,952	105,802
Total Assets	135,83	148,132	162,978	168,518	189,635	217,166	242,988	255,605	281,619	302,438
Total Current Assets	57,003	61,118	67,458	70,441	77,145	91,847	102,052	106,735	121,613	127,8
Total Liabilities	97,877	106,795	117,468	125,155	145,051	162,542	183,855	190,291	215,566	239,597
PSA	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Revenue	56,061	59,912	55,446	54,09	53,607	54,676	54,03	65,21	74,027	74,731
EBIT	1,736	0,898	-4,698	-1,346	0,223	1,976	2,611	3,087	4,4	4,668
PP&E	13,728	14,074	12,438	10,915	10,831	10,894	11,293	13,278	14,136	16,922
Intangible Assets	6,451	7,051	5,697	5,593	5,854	6,151	6,68	11,237	12,809	14,6
Total Current Liabilities	41,551	41,944	41,676	38,843	30,903	22,958	20,397	29,234	30,002	31,7
Total Assets	68,491	68,991	64,84	59,664	61,212	49,11	45,153	57,505	61,952	69,766
Total Current Assets	45,41	43,363	43,243	39,65	22,031	19,424	21,188	26,188	28,146	31,327
Total Liabilities	54,188	54,497	54,292	51,873	50,794	36,891	30,535	40,785	42,358	47,965
Volkswagen	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Revenue	126,875	159,337	192,676	197,007	202,458	213,292	217,267	230,682	235,849	252,632
EBIT	7,141	11,271	11,51	11,671	12,697	-4,069	7,103	13,818	13,92	16,96
PP&E	25,847	31,616	39,424	42,389	46,169	50,171	54,033	55,243	57,63	66,152
Intangible Assets	13,104	21,992	59,158	59,243	59,935	61,147	62,599	63,419	64,613	66,214
Total Current Liabilities	76,9	101,057	105,513	118,625	130,706	148,489	177,515	160,389	167,968	167,924
Total Assets	199,393	253,626	309,644	324,333	351,209	381,935	409,732	422,193	458,156	488,071
Total Current Assets	85,936	105,64	113,061	122,192	131,102	145,387	155,722	160,112	183,536	187,463
Total Liabilities	150,681	190,272	227,819	234,296	261,02	293,665	316,822	313,116	340,814	364,42

Variables

BMW	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Size	4,102263	4,231509	4,341829	4,331496	4,387027	4,523689	4,545027	4,591862	4,579647	4,646408
Profitability	0,046795	0,06496	0,06295	0,057716	0,058901	0,055717	0,049784	0,051064	0,043645	0,0325
Growth Potential	0,046217	0,042437	0,039492	0,044656	0,041982	0,042817	0,043265	0,048914	0,052498	0,051435
Liquidity	0,930083	0,963452	0,958764	0,959156	1,039301	1,060811	1,016977	0,964586	0,848823	0,911674
Asset tangibility	0,104973	0,09467	0,101183	0,109223	0,110993	0,103146	0,095261	0,095466	0,094751	0,101937
Liability (%of total)	0,787887	0,780416	0,76942	0,742404	0,758164	0,751623	0,748784	0,718073	0,72204	0,737289
Daimler	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Size	4,582526	4,668521	4,7388	4,770532	4,866549	5,007076	5,032142	5,101877	5,120159	5,151817
Profitability	0,053552	0,059103	0,05286	0,064177	0,056698	0,060719	0,053097	0,05744	0,039529	0,014314
Growth Potential	0,055246	0,055754	0,054517	0,055709	0,049395	0,046365	0,049788	0,053735	0,052557	0,052831
Liquidity	0,932214	0,897526	0,870438	0,839114	0,868157	0,839233	0,827588	0,816087	0,80544	0,827872
Asset tangibility	0,129522	0,129479	0,126391	0,129238	0,122245	0,111997	0,108569	0,10947	0,109893	0,122812
Liability (%of total)	0,720585	0,720945	0,72076	0,74268	0,764896	0,748469	0,756642	0,744473	0,765453	0,792219
PSA	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Size	4,02644	4,092877	4,01541	3,990649	3,98168	4,001425	3,989539	4,177613	4,30443	4,313895
Profitability	0,025346	0,013016	-0,07246	-0,02256	0,003643	0,040236	0,057826	0,053682	0,071023	0,066909
Growth Potential	0,094188	0,102202	0,087862	0,093742	0,095635	0,125249	0,147941	0,195409	0,206757	0,209271
Liquidity	0,915019	0,967276	0,963763	0,979647	1,402705	1,18194	0,962668	1,116313	1,065942	1,011907
Asset tangibility	0,200435	0,203998	0,191826	0,182941	0,176942	0,221829	0,250105	0,230902	0,228177	0,242554
Liability (%of total)	0,79117	0,789915	0,837323	0,869419	0,829805	0,751191	0,676256	0,709243	0,683723	0,687513
Volkswagen	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Size	4,843202	5,071021	5,26101	5,283239	5,310532	5,362662	5,381127	5,44104	5,463192	5,531934
Profitability	0,035814	0,044439	0,037172	0,035985	0,036152	-0,01065	0,017336	0,032729	0,030383	0,034749
Growth Potential	0,065719	0,08671	0,191052	0,182661	0,170653	0,160098	0,15278	0,150213	0,141028	0,135665
Liquidity	0,894852	0,956617	0,93324	0,970808	0,996979	1,021336	1,139948	1,00173	0,915177	0,895771
Asset tangibility	0,129628	0,124656	0,12732	0,130696	0,131457	0,13136	0,131874	0,130848	0,125787	0,135538
Liability (%of total)	0,755699	0,750207	0,735745	0,722393	0,743204	0,768887	0,773242	0,741642	0,743882	0,746654