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VALUATION OF A PRIVATE COMPANY FOR A MERGER AND ACQUISITION

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Preface

In front of you is the master thesis “Valuation of a private company for a merger and acquisition”. This thesis has been written to complete the master Industrial Engineering and Management at the University of Twente, specialisation Financial Engineering and Management. I was engaged with writing this thesis from January to July 2021.

The study was undertaken at the request of Company X where I conducted my graduation assignment. This assignment provided me the opportunity to dive into my interest for mergers and acquisitions, which has been a very valuable experience to me. Together with my supervisors from Company X and my supervisor from the University of Twente I formulated the research question that has been central to this study.

I would like to thank Berend Roorda for his guidance and support during my graduation assignment. Furthermore, I would like to thank Reinoud Joosten for his feedback, which helped to improve my thesis. Also, I would like to thank my supervisors from Company X for the pleasant cooperation and the support I received from them during my graduation process. Finally, I would like to thank my parents and friends who have been very supportive during my graduation period. They helped me debating my issues together. They helped me to keep me motivated with their wise counsel.

I hope you enjoy your reading.

Dolf Reineman

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Abstract

Valuation is an important part of a merger and acquisition and there are many ways of estimating the value of a firm. Often valuation tools are used to estimate the value of a firm and there are several basic tools publicly available. However, there is no publicly known valuation method that takes into account the specific characteristics of the sector in which a company operates, which could play an important role on the value. We investigate how to value a private company while incorporating the sector-specific characteristics of the company. Therefore, the following research question was created: How to determine the acquisition value of a private company in the company vehicles sector? To answer this question, we have developed a support tool that incorporates these characteristics and provides several estimations of the firm value to support the decision-making process surrounding an acquisition. The research was performed for Company X because they potentially want to acquire companies in the future for strategic reasons. However, they need a valuation of these companies to consider whether an acquisition is appropriate. Company X operates in the company vehicles sector. Therefore, this sector is taken into account in the design of the tool.

Before designing the tool we conducted a literature research. First, we selected the appropriate methods for a private firm valuation. This resulted in the free cash flow to the firm method. In addition, the economic value added method and the use of multiples were also selected to provide additional insights. Second, we described the use of the methods to understand the calculations of the methods and the data required to do these calculations. Third, we investigated the different factors that influence the valuation. Therefore, the characteristics of the company vehicles sector influencing the valuation were described. This resulted in several factors, of which in particular the beta, the financial leverage and the cyclicality of the sector in relation to the EBITDA margin proved of interest.

Since all factors influencing the valuation were known, the tool could be designed in Excel. It consists of three parts, which are the input, the calculations and the output. The input has two parts, the question and answer box and the input data that already have been incorporated in the tool. The calculation part determines for each scenario the firm value, using the three different valuation methods. We combine and present the result of these calculations in the output part of the tool. In the output part, a scenario analysis and a sensitivity analysis are given. The sensitivity analysis shows the results of the basis scenario. This shows the effect on the firm value when the value of variables slightly changes.

The tool was applied on two fictitious firms to test it and to understand the factors influencing the valuation. The results showed that the firm value increases when the revenue growth rate and the EBITDA margin increase and the WACC decreases. From this we concluded that the tool is capable of valuing a firm for different scenarios and to incorporate the sector-specific characteristics.

The contribution of our research to the theoretical knowledge is that a method is developed to capture the sector-specific characteristics into the valuation. There are several practical contributions. The tool captures the characteristics of the company vehicle sector into the valuation, resulting in a more accurate valuation of the firm. It enables the valuation of a firm under several scenarios, which gives a better understanding of the firm value. The tool makes a distinction between the revenue and cost synergies, which contributes to the understanding of the effect of synergies on the firm value. It provides transparency through its design, which helps with evaluating how the value is created and the performance of the firm.

The limitations of this research are concerned with the simplifications made in the tool, the limited amount of data available and the difficulty to check the validity of the research.

Our recommendation is to use this tool when valuing a firm for a potential acquisition. Second, the firm should consider for which part of the firm value they want to pay. Third, we recommend to use the tool to reflect on estimations about the performance of the company. Lastly, the fixed and variable costs of the company operating in the sector should be investigated.

Further research could focus on the forecasting of the economy and revenue growth rates of the firm. Also, research could focus on determining the beta for the company vehicles sector. Improving the modelling of the behaviour of the EBITDA margin could be investigated further. In addition, further research could investigate to extend the modelling of the EBITDA behaviour to other sectors.

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Acronyms

Acronym	Meaning
APV	Adjusted present value
CAPM	Capital asset pricing model
DCF	Discounted cash flow
EBIT	Earnings before interest and taxes
EBITDA	Earnings before interest, taxes, depreciation and amortization
EV	Equity value
EVA	Economic value added
GDP	Gross domestic product
NOL	Net operating losses
WACC	Weighted average cost of capital

1. Introduction

Company X is a specialist in company vehicles and is concerned with the sale, reparation and service, damage repair and rental of several brands. Approximately 90% of their revenue is created by vehicles from one brand. Company X consists of several locations situated in the Netherlands, and has around 200 employees. Company X is together with Company Y part of Group Z. These are two separate organisations which operate independently.
Company Y is a logistic organisation specialised in the transport and warehousing in food and related products. They have approximately 1,000 employees in several locations throughout the Netherlands.

The assignment will be conducted for the management department of Company X in combination with Group Z. This is because the assignment is about a potential future acquisition by Company X, but Group Z supports the process of the acquisition with knowledge and experience, and is therefore closely involved in the process.

1.1. Research motivation

Company X would like to expand their business in the future as part of their strategy. The organisation expects that this is needed to continue their business in the long term. Therefore, they potentially want to acquire a company. This company still has to be found, however the focus is now on valuing the company to be acquired if one is found. Company X would like to acquire a similar company to themselves. This means, that they are concerned with the sale, reparation and service, damage repair and rental of similar brands as them.

So, when Company X finds a potential company they would like to make a decision on proceeding with the acquisition, however they run into several difficulties, which are discussed in Section 1.2. This research supports the decision-making process by providing a support tool for the valuation of the company.

1.2. Problem description

Company X considers acquiring a company in the future and has the complex task to value this company. The complexity of the valuation is caused by several aspects. It is difficult to determine which factors should be taken into account and their input values, also it is difficult to which extent they should be taken into account. Factors are the components that determine the total value of a company. For example, next to the value of the company itself, the synergies that come from acquiring a company could have an added value for the acquisition. However, it is not known whether this should be taken into account for the value of the company since it is not sure that these are (fully) realised and what the exact value of this factor is.

Which valuation method is the most appropriate to use given the context of the company is also difficult to determine, since the company is a private company with certain characteristics and operates in a sector which also has characteristics that potentially could influence the valuation and therefore should be considered in the valuation method. Since the valuation method is an estimate, the use of multiple valuation methods is also considered to provide additional valuations.

Furthermore, another factor influencing the valuation such as the future revenues could be influenced by the uncertainty about the changing market conditions in which the company operates, for example, the increasing demand for electric vehicles (BOVAG, 2019; Heid et al., 2017; Innovam & BOVAG, 2014). Again determining what the effect of these changes are and their impact on the valuation is difficult. The factor of the necessity for doing this acquisition could also increase or decrease the estimated value. So, several difficulties exist when attempting to value the company to be acquired. These difficulties have to be tackled in order to make a decision about the appropriateness of the acquisition.

These difficulties can be summarised under the core problem which has to be solved. The core problem is the most important problem that has to be solved (Heerkens & van Winden, 2017). The decision-making process of the management to acquire the company depends on the unknown value of the company. This is caused by several problems which are related to each other and therefore can be seen as part of one problem, which is the core problem.

So, the core problem to be solved can be formulated as:

"It is unknown how to value a private company with uncertainty in the factors and operating in a specific sector so that the valuation represents the specific conditions that apply."

1.3. Research objective

The research objective is based on solving the core problem of the organisation. Therefore, the research objective is to develop a tool to estimate the value of a private company. Based on the literature study we select one main valuation method, which we use in the valuation support tool. In addition, we use two extra valuation methods to give different views on the valuation.

We investigate different factors to better understand their impact on the value and these are taken into account in the tool. Using this tool, the organisation can determine a range of acquisition values for a private company. This can be used for the decision-making process about the acquisition being appropriate or not. This decision-making process does not only consist of the valuation since other aspects such as legal conditions also play a role. The support tool gives the possibility to the organisation to determine the value of an organisation under uncertainty since the tool can take into account that not all inputs are certain values. The tool is developed for the situation of company X, however it can also be used in different cases. It can be applied to companies that are cyclical and are concerned with the sales and maintenance of company vehicles.

1.4. Research scope

Our research focuses on the valuation of private companies, meaning that the valuation of publicly traded companies is out of scope. This influences the choice for a valuation method, however it could be that elements from methods for valuation of listed companies are used for the tool, because these can provide additional insights into the valuation.

Next to that, the scope is defined by the focus on a specific sector. The choice to focus on this specific sector can influence the choice of valuation method and therefore defines the scope of the research.

The level of detail in which the factors are discussed, is part of the research scope. This depends on the importance of factors and the complexity of the factors. Factors can be of less importance and have no significant impact on the valuation and are therefore only discussed in general. Factors that are of significance for the valuation are discussed in more detail.

The research scope is also defined by the development of the valuation tool. The tool is usable for different input values, which makes it applicable to different companies. However, the main valuation method, which is part of the tool, can not be changed. Meaning that the choice for this method defines the scope of the research.

1.5. Research (sub) questions

We present the main research question. This question can be divided into four research questions and these also can be divided into sub-questions. These sub-questions are made to make the research questions less complicated and more feasible to solve. The research questions and sub-questions are given below.

Main research question: *How to determine the acquisition value of a private company in the company vehicles sector?*

Research questions:

1. *Which methods are appropriate to determine the value of a private company?*
    - *Which current methods exist for determining the value of a company?*
    - *What is the most appropriate method for determining the value of a private company?*

2. *What is the discounted cash flow method in particular for this sector?*
    - *How does the discounted cash flow method work for a company operating in a specific sector?*
    - *What are synergies?*
    - *What is goodwill?*

3. *Which factors impact the acquisition value of a private company operating in a specific sector?*
    - *What are the relevant characteristics of the specific sector impacting the valuation?*
    - *How does FCFF impact the acquisition value of a private company in a specific sector?*
    - *How does WACC impact the acquisition value of a private company in a specific sector?*
    - *How does tax impact the acquisition value of a private company in a specific sector?*
    - *How to cope with uncertainty in valuation?*

4. *How to translate the impact of the factors into a support tool for valuation?*

1.6. Methodology

We now describe the method of data collection and the method of data analysis. We conducted both qualitative and quantitative research.

The strategy for obtaining the necessary information to solve the research problems is similar for the first, second and fourth research question. We performed a literature study to obtain information on the different topics. Scientific platforms are used for this research such as Scopus, Web of Science and Google scholar and provide most of the scientific literature. Also, we obtained information using reports from large consultancy firms with information, statistics and vision about mergers and acquisitions.

Data sources used are the company itself and the information from the due diligence. The company provides data on estimates about synergies and from the due diligence information about the company to be acquired can be obtained such as the balance sheet and income statement.
Experts from the company are consulted for information about the sector specifically, such as market growth and market developments. Also, these experts are asked for data about multiples which are of interest for the valuation. Next to that, information about the sector is researched using online sources.

We analyse data to combine the information to answer the research questions. We use the knowledge obtained from the literature study to select a valuation method and to give information about the use of the method. We use information about which factors should be included in the valuation of the company. Furthermore, we use the information on the development of the valuation support tool.

The strategy for obtaining information on the third research question is slightly different. Information is obtained doing literature study, however information is also required from the organisation.
Therefore, the strategy is to obtain knowledge by conversations with people closely involved in the acquisition and to analyse the information about the acquisition that the organisation provides. It is important to obtain objective information, so that it will not bias the valuation of the company.

We analyse the information using the valuation support tool, which will be developed in Excel. The data have to be processed in Excel, so it could be that the data have to be transformed.

1.7. Limitations

A limitation of this research can be the lack of data on the performance of companies in the sector. In particular, it can be difficult to obtain data on the sector operating in The Netherlands. However, since the company operates in The Netherlands it is important that the information is based on the same sector and country. These data are used in the valuation support tool and therefore accurate data are needed, since they directly influence the valuation.

Another choice we made is to discuss some topics to a limited degree. For example, there are a lot of valuation approaches which have choices within, these are not all discussed. Only the relevant approaches are discussed in more detail. However, an overview of the main approaches is given to give insight into the different approaches available for valuation.

The scope of the valuation support tool can be seen as a limitation. The tool is applicable in the specific situation of this case. Meaning that this tool is not appropriate for every valuation. For example, in the case of a valuation of listed companies, a different method could be more appropriate.

1.8. Outline

In Chapter 2 we discuss the literature review which concerns the different valuation methods. Chapter 3 discusses the discounted cash flow method specifically for the case. In Chapter 4 we discuss the impact of factors on the valuation. We describe the development of the valuation support tool in Chapter 5. In Chapter 6 we explain the data analysis and the specific data of the companies to be analysed is given. Chapter 7 presents the results from the data analysis using the valuation tool. In Chapter 8 we give a conclusion about the validity of the valuation tool and the results, and we present the recommendations for further research.

2. Valuation approaches

In this chapter we describe the possible valuation methods mentioned in literature and discuss the reasons for selecting an appropriate method.

According to Damodaran (2012), there are four general approaches for valuation. These approaches are the discounted cash flow (DCF) valuation, the asset-based valuation, the relative valuation and the contingent claim valuation. Within these methods there are further choices in order to determine the final value. We discuss the different approaches in the following sections.

Damodaran's (2012) explanation of the approaches is used in this chapter as a basis, since his description of approaches seems to be complete and appropriate for this research. The reason for being appropriate is that the different general valuation approaches are described with comprehensive explanations about the use of these methods for different cases.

2.1. Discounted Cash Flow valuation

According to Damodaran (2012), the discounted cash flow approach is based on the value of any asset is the present value of the expected future cash flow on the asset. The discounted rate used is a function of the riskiness of the estimated cash flows, where a higher discount rate is used for riskier assets. This approach is the foundation on which all other valuation approaches are built.

Rosenbaum & Pearl (2013) describe that the discounted cash flow analysis is based on the principle that the value of an asset can be derived from the present value of its projected free cash flows. The company can be viewed as a cash flow generator and the value of the company can be determined by determining the present value of the generated future cash flows using a discount rate matched to the risk of these cash flows (Fernández, 2002).

There exist thousands of discounted cash flow models, however they can vary only in a couple of dimensions (Damodaran, 2012). There is a choice in approach between equity and firm valuation. Another choice for approach is to use the cost of capital approach or the adjusted present value (APV) approaches. Next to that, the choice can be made to use total cash flow or excess cash flow models. The approaches will give the same estimate of value, if the assumptions about the cash flows and risk are consistent. The appropriate model will be discussed in Section 2.5.

The discounted cash flow approach is easiest to use for firms whose cash flows are currently positive and for future periods can be estimated with some reliability. However, there are also some situations in which the discounted cash flow valuation might have trouble working and needs to be adapted (Damodaran, 2012). Some situations which could cause difficulties are firms in trouble, cyclical firms, firms with unutilized assets, firms with patents or product options, firms in the process of restructuring, firms involved in acquisitions and private firms.

When firms are involved in acquisitions, there could be synergies and it requires assumptions to value these. The effect of hostile takeovers on the cash flows and risk has also to be estimated. A problem for using discounted cash flow valuation models for the valuation of private firms is the measurement of risk, which is used to determine the discount rate (Damodaran, 2012). This does not mean that in these situations discounted cash flow valuation can not be performed, however the valuation models used should be adapted.

2.2. Asset-based valuation

Damodaran (2012) describes that the asset-based valuation approaches estimate the firm value by aggregating the individual assets owned by a firm. Pinto et al. (2015) describe that the asset-based valuation approach, also called the cost approach, is based on the values of the underlying assets of the firm less the value of any related liabilities. They also mention that the method is generally considered as the weakest valuation method from a conceptual standpoint for valuing an ongoing firm.

Damodaran (2012) mentions three approaches. The first one is the liquidation value, which considers what the market will be willing to pay for similar assets if the assets were liquidated today. The second approach is the replacement cost, which evaluates how much it would cost to replicate or replace the assets that a firm has today. The last approach uses the accounting book value to measure the value of the assets and if necessary adjustments to this book value are made.

The asset-based valuation approaches are not alternatives to the other approaches to estimate value since the liquidation or replacement values have to be obtained using one of the other approaches (Damodaran, 2012).

2.3. Relative valuation

Damodaran (2012) describes that the relative valuation estimates the value of an asset by looking at the pricing of comparable assets, using a common variable such as earnings, cash flows, book value or revenues. Some multiples mentioned are the price-earnings ratio, price-book value and EV to EBITDA. He also mentions that this method is done for the most valuations in the real world. According to Pinto et al. (2015), relative valuation estimates the value of assets relative to that of other assets. The underlying idea is that similar assets sell at similar prices and that relative valuation is done using price multiples, where the most familiar is the price-to-earnings ratio.

There are multiple relative valuation models, mostly based on the pricing of comparable assets at the same time, but sometimes based on fundamentals (Damodaran, 2012).

According to Damodaran (2012), when fundamentals are used, the approach relates multiples to fundamentals about the firm that is valued, such as growth rates in earnings and cash flows, reinvestment and risk. An advantage of this approach is that it shows the relationship between multiples and firm characteristics. This provides the possibility to investigate the effect on multiples when characteristics change. When using comparables, the valuation is done based on using multiples to compare how similar firms are priced by the market.

Another choice that can be made is to make cross-sectional or time series comparisons (Damodaran, 2012). Cross-sectional comparisons are when multiples are compared with the average multiple of other comparable companies. However, to compare firms assumptions have to be made about their fundamentals. When time series comparisons are made, the multiple the firm trades at today can be compared with the multiple it used to trade at in the past. To make this comparison, the assumption has to be made that the fundamentals of the firm have not changed over time.

Damodaran (2012) describes that the use of multiples can be attractive since it is simple and easy to relate to and can be used quickly to obtain value estimates for firms and assets. When there are a large number of comparable firms traded on the financial markets it is particularly useful, since the market on average values the firms correctly. However, they are more difficult to use when valuing firms that are unique and do not have obvious comparables, with little or no revenue and negative earnings.

Furthermore, multiples can easily be misused and manipulated according to Damodaran (2012), especially when comparable firms are used. Comparable firms is a subjective definition since no two firms are exactly the same in terms of risk and growth. Therefore, a biased analyst can select a group of comparable firms that confirms the analyst biases about the value of a firm. Another problem could be

that the multiples that are used are based on comparable firms that are overvalued or undervalued by the market.

2.4. Contingent claim valuation

According to Damodaran (2012), the contingent claim valuation is an approach in which an asset with the characteristics of an option is valued with the use of an option pricing model. The idea behind using option pricing models is that when discounted cash flows models are used they tend to underestimate the value of assets that provide payoffs that are contingent on the occurrence of an event.

Damodaran (2012) describes that contingent claim valuation can be used in different scenarios. For example, if the possibility to delay making a firm's investment decisions is considered, it can be used to value a patent or an undeveloped natural resource reserve as an option. Another scenario is the possibility to expand as a young firm with potentially large markets can also create a premium on the values which are determined using the discounted cash flow method. Also, to determine the value of equity, the option to liquidate troubled firms can be used.

Contingent claim valuation is also called in literature as real option valuation. Brealey et al. (2017) describe that real options can be used to value a project. This is the flexibility to modify, postpone, expand or abandon a project. To determine the value of real options the Black-Scholes formula can be used, for example to determine the value of options in which a one-time expansion or abandonment occurs. In the case of more complex options, a decision tree is often used. Which shows the possible future things that can happen and the counteractions which can be taken. Working back this tree from the future to the present helps to determine what to do when an event occurs and maximize the value. This determines if the option is an appropriate action to perform.

Koller et al. (2005) describe that real options can be used to correctly capture the value of flexibility. Flexibility can come in many forms, such as the option to defer, expand, contract, abandon or switch projects on and off. Flexibility can change the value of a business, because it gives the managers the option to change investment decisions as the business develops. The discounted cash flow does not take this flexibility into account.

The option pricing models can be categorized on whether the underlying asset is a financial asset or a real asset. Another categorization is based on whether the underlying asset is traded or not.

There are limitations in the use of option pricing models to value long-term options on nontraded assets. When the underlying asset is not traded, the inputs for the value of the underlying assets and the variance in that value have to be estimated because these can not be extracted from the financial markets. This means that the final values determined using the option pricing model have much more estimation error in the values than when values are determined in more standard applications.

2.5. Selection of valuation approaches

The choice for valuation method is an important step because different approaches can lead to different values. The choice for valuation method depends on several factors which can be divided into two types, the asset or business characteristics and the characteristics of the analyst.

The business characteristics

The asset or business characteristics can be divided into different subjects which all influence the choice for valuation method. The marketability of the assets, the cash-flow-generating capacity and uniqueness in terms of operations of the business are of importance.

The marketability of the assets takes into account how difficult it is to separate assets and to value each asset based on the market. If this can be done easily, asset-based valuation is a possible method, since the liquidation value and replacement cost valuation can be used. In the case that the assets are difficult to separate or resemble not the true value, such as high-growth business, this method is not appropriate and other valuation approaches are more appropriate.

The cash-flow-generating capacity of a business determines the appropriate valuation method for that business. The cash-flow-generating capacity of the assets of a business can be divided into three types, which lead to a different valuation method. These are assets generating cash flows currently or are expected to do so in the near future, assets that do not generate cash flows but could do in the event of a contingency and there are assets that will never generate cash flows.

The assets that generate cash flow currently or are expected to do so in the near future can be valued using the discounted cash flow approach. This can be done when the cash flows are positive or negative. The assets that generate cash flows in the event of a contingency can be valued using opting pricing models, so using the contingent claim valuation approach. Assets that never will generate any cash flows can be valued using relative valuation.

The uniqueness in terms of operations examines whether a business can be compared easily or that a business is so unique that no comparable companies can be found. When assets or businesses are part of a large group of similar assets or businesses, with no or very small differences between them, the relative valuation is appropriate. Comparable assets can be combined to determine the value of a business and controlling for differences between assets is simple. When assets are less comparable, this method is less reliable for valuation. For a unique business, the discounted cash flow method will provide much better estimates of value.

The characteristics of the analyst

The characteristics of the analyst are also of importance for the choice of valuation method and can be divided into several subjects. The subjects that influence the choice for valuation approach are the time horizon, the reason for doing the valuation and the assumptions about markets.

The time horizon that is used determines the valuation approach. If the business is seen as an ongoing concern that could last into perpetuity, the discounted cash flow valuation is appropriate. When the assumption is made that the business ceases its operations today, the liquidation valuation is appropriate. Relative valuation and contingent claim valuation are positioned between the two previously mentioned methods when considering the time horizon. A relative valuation approach is more appropriate on a shorter time horizon and the discounted cash flow method should be used when using a longer time horizon. This could explain why the discounted cash flow method occurs more often when valuing a firm for an acquisition and that relative valuation is more used for equity research and portfolio management.

Another characteristic of the analyst is the reason for doing the valuation. The valuation approach depends on the reason for doing the valuation. The market can be seen as neutral and companies are judged on a relative basis, then the relative valuation approach is appropriate. In the case that the view

on the market is also taken into account and the business has to be judged on an absolute basis then the discounted cash flow method is appropriate. This can be the case when valuing a company on intrinsic value, which is needed to determine if an acquisition can be done.

The assumptions made about the market also influence the choice of valuation method. The discounted cash flow method assumes that market prices deviate from the intrinsic value of a company but that these prices are corrected by themselves over time. Relative valuation assumes that the markets are on average correct. However, individual business in a sector or market could be mispriced but the sector or overall market is fairly priced. Asset-based valuation assumes that the markets for real and financial assets may diverge and that these differences can be used to take advantage. When using contingent claim valuation, the assumption is made that markets are not very efficient at assessing the value of flexibility that businesses have and therefore option pricing is used.

The marketability of the assets can be partly done since some tangible assets, such as buildings can be valued on a relative basis. However, this does not resemble the true value of the company since this valuation takes not into account the value of the different assets working together. Therefore, the discounted cash flow analysis is more appropriate. The cash-flow-generating capacity also indicates to use the discounted cash flow method since the company is already generating cash flows.

The uniqueness in terms of operations of the business is more difficult to determine, since there are similar companies doing the same kind of business. However, the structure of these companies can be different and the number of companies with a comparable size operating in the same market conditions is probably limited. Therefore, it is uncertain how reliable relative valuation would be. Assuming that the company has a unique way of doing business the discounted cash flow method could be more appropriate.

The time horizon is long, since we assume that the company will be operating for a long time in the future, which can be seen as into perpetuity. Therefore, the discounted cash flow method is appropriate.

The reason for doing the valuation is in this case to determine the intrinsic value of the company since potentially an acquisition is done. Therefore, the market also has to be examined in order to know whether the market overall is not under- or overvalued.

We assume that the market value of a company can deviate from the intrinsic value. This is corrected over time, however when doing a potential acquisition, the price to be paid should be based on the intrinsic value. With relative valuation we assume that the markets in general are priced correctly, however that an individual business can be mispriced. When doing an acquisition, a company probably would not like to misprice a business and therefore relative valuation is less appropriate.

So, the discounted cash flow method is selected as the appropriate method. Furthermore, the multiple approach is used to give additional insight into the value of the company relative to the performance and value of the other companies in the sector. However, the valuation method selected has to be adapted to the characteristics of the business being valued. This means that further choices within the model have to be made, based on the business characteristics. Therefore, the selection of the discounted cash flow model is explained and a short explanation of the choice of relative valuation method is given.

Selection of discounted cash flow model

The appropriate discounted cash flow model to use depends on a number of characteristics of the business being valued. The different choices are made based on these characteristics in order to select an appropriate model for the valuation and these will be discussed below.

First, the cash flow to discount should be selected. The choice can be made between the free cash flows to equity, the free cash flows to the firm and the dividend discount model. When the assumptions about growth and leverage are consistent, the same value will be determined when using the free cash flows to equity or the free cash flows to firm model.

In the case that the firm to be valued has a stable leverage, both the free cash flows to equity and the free cash flows to the firm can be used. However, in the case of a firm with an unstable leverage, the free cash flows to the firm model is simpler to use. The reason for this is that no cash flow projections from interest and principal payments are required and this model is much less sensitive to errors in the estimation of the leverage changes.

In the case that equity has to be valued, the free cash flows to equity or the dividend discount model can be used. When the entire firm has to be valued, the free cash flow to the firm model is an approach that can be used. The use of the discount dividend model is only appropriate when the cash flows can not be estimated with any degree of precision or if there are significant restrictions on stock buybacks, other forms of cash return and no or little or no control over actions of the management with cash. In all other situations, the value of a firm is more realistic estimated using the free cash flow to equity model.

Since the free cash flows to firm model has a more structured approach, values the entire firm and covers the fact that the firm to be valued can change their debt ratio during the moment of valuation, it is the preferred model to use in our opinion. Besides, the method gives insight into the specific cash flows, which are interesting since these are difficult to determine. A method such as relative valuation is more a “black box”, and in this case it is of interest to determine which factors contribute to the value of the firm, therefore the discounted cash flow method is more appropriate. In addition, the data provided for the valuation best fit a discounted cash flow method, since the data have the form of revenue statements and a balance sheet.

Second, the choice between current or normalized earnings should be made. In most situations the current financial statements and the reported earnings can be used. However, in some situations the earnings are negative, or abnormally high or low. In this case, the current earnings can be replaced with a normalized value, which is estimated based on the company’s history or industry averages. These values can be used to determine the value of the firm. This is the easiest way to adapt if the causes for the negative or abnormal earnings are temporary or transitory. This can be the case when dealing with a cyclical firm, a firm which undertakes an extraordinary charge or a firm in the process of restructuring. Since the earnings are assumed to be normal, the current earnings can be used for the valuation.

Third, the growth patterns also influence the choice of model. The assumption can be made that a firm is already in stable growth or in a period of constant high growth and then drop the growth rate to stable growth, which is called a two-stage growth model. Another possibility is that a transition phase to get stable is allowed, which is called a three-stage or n-stage model. The choice for the model depends on the growth momentum and the source of growth.

The level of current growth in earnings and revenues influences the choice of growth pattern. There are three groups. Stable-growth firms have earnings and revenues growing at or below the nominal growth rate in the economy that they operate in, which is less than 8 percent of the economy growth rate. The steady state models provide good estimates of value for this situation.

Moderate-growth firms have earnings and revenues growing at a rate that is moderately higher than the nominal growth rate in the economy. A moderate growth rate can be seen as a rate which is between 8

and 10 percent of the economy growth rate. The two-stage model should provide enough flexibility to capture the changes in the characteristics of the firm.

High-growth firms have earnings and revenues growing at a rate much higher than the nominal growth rate in the economy, which means more than 10 percent of the economy growth rate. In this case, a three-stage or n-stage model is needed to capture the longer transitions to a stable growth.

The source of growth has also an influence on the choice of growth pattern. The source of growth comes from competitive advantages and can be time-limited. Time-limited means that the higher growth rate probably disappears abruptly, such as with specific advantages caused by for example legal barriers like patents. This source of growth follows a two-stage model. When the sources of growth are more general caused by for example competitive advantages like economies of scale, the growth rate is more likely to decline more gradually over time. In this case, a three-stage or n-stage model is appropriate. The speed of decline of this competitive advantage depends on the nature of the competitive advantage, the competence of the firm's management and the ease of entry into the firm's business.

Since the firm to be valued can potentially have a temporary unstable growth rate caused by the acquisition, a two-stage model is used. However, the tool gives the possibility to have similar rates for both periods, enabling it to function like a stable-growth model.

In conclusion, the discounted cash flow model we use is the free cash flow to the firm model, where we consider the current earnings. This is done using a two-stage growth model.

In addition, another discounted cash flow approach we use is to give more insight into the value creating capability of the firm. The free cash flow to the firm model considers the total cash flows of a firm and uses these to estimate the value of a firm. However, the free cash flows to the firm do not separately capture the required return on the invested capital. So, the free cash flows do not make the distinction between the cash flows that are free of the required return on the firm or not, because the cost of the invested capital is not yet subtracted. This will be done when discounting the cash flows at an appropriate discount rate. Therefore, we use an excess cash flow model will be used. The excess cash flow models only consider the cash flows earned in excess of the required return as value creating. The present value of these cash flows can be added to the invested capital in the firm to estimate the value of the firm (Damodaran, 2012).

The specific approach that we use of the excess cash flow models is called economic value added (EVA) and is a trademark of Stern Stewart & Co. According to Damodaran, the economic value added measures the euro surplus value created by a firm on its existing investment (Damodaran, 2012). Economic value added is also called economic profit and is described as the spread between the return on invested capital and the cost of capital times the amount of invested capital, which is the value created by a company (Koller et al., 2005). It can also be described as the net income after deducting the dollar return required by investors (Brealey et al., 2017). So, in the case that the return on the investment equals the cost of capital, EVA is zero, meaning no value is created by the company.

The approach will lead to the same value of the firm when using the free cash flow to the firm model, if the assumptions made are consistent (Damodaran, 2012). However, the EVA method will give more insight into the excess cash flows of each year, which helps with understanding when a firm creates value or destroys value. EVA shows the cost of capital which can play a major role in valuation, especially in a sector that is capital intensive, which will be explained in Section 4.2. The use of the EVA approach will be explained in the next chapter, since it has some overlap with the free cash flow to the firm model and therefore makes more sense to explain it after.

Selection of relative valuation model

The relative valuation values firms based on multiples. The choice to use which multiples can be based on two relevant approaches, which are the bludgeon view and the best multiple. Besides, it should be taken into account if this multiple is based on the market or sector.

The bludgeon view takes many multiples into account in order to determine the value of a firm. There are three ways to estimate the final value. The first is to give a range based on the lowest and highest value obtained using the multiples. The second, is to take the average of the values determined using the multiples. And the third is to take the weighted average of the values. The weight attached to a value reflects the precision of the estimate.

The best multiple approach selects a multiple based on which multiple will give the best estimation of the value of the firm. This multiple can be determined in three ways, which are the fundamentals approach, the statistical approach and the conventional multiple approach.

The fundamentals approach considers the multiple that has the highest correlation with the value of the firm. The statistical approach determines the best multiple with the highest R-squared value, since this multiple can be explained the best using fundamentals and therefore can be used to value companies in the sector. The conventional multiple approach selects the multiple that is most commonly used in the sector.

How this multiple will be determined also depends on whether companies are compared to their sector or based on the market. This choice depends on the analyst who decides which firms are seen as representative enough to be comparable firms.

For the relative valuation, the best multiple will be selected based on the conventional approach. The reason for this is that the other methods are not feasible within the limited time of this research and do not add a significant contribution to the valuation tool. The multiples that are commonly used in the sector are the EV/EBITDA, EV/EBIT and EV/Sales. Therefore, these multiples will be used in the valuation support tool.

Table 1 provides an overview of the selected valuation approaches and the choices made within these approaches.

TABLE 1:VALUATION APPROACHES AND CHOICES MADE WITHIN APPROACHES.

Valuation method	Choice within method

Discounted cash flow model	- Free cash flow to the firm model
	  o Current earnings
	  o Two-stage model

	- Excess cash flow model o Economic value added

Relative valuation model	- Conventional approach
	  o EV/EBITDA
	  o EV/EBIT
	  o EV/Sales

3. How to apply the Discounted Cash Flow

In Section 3.1 we describe the free cash flow to the firm method in general. In Section 3.2 we explain the economic value added method. Section 3.3 explains the different types of motives. Section 3.4 describes how to determine the value of control and Section 3.5 explains how to value synergies. In Section 3.6 we explain goodwill and how to value this. For this chapter, Damodaran's (2012) explanation of the discounted cash flow will be used as a basis, since his approach seems complete and is clearly explained.

3.1. The free cash flow to the firm method

As mentioned in Section 2.5, the method we use is the free cash flows to the firm method. We determine the value of the firm by discounting the expected free cash flows to the firm, which are the residual cash flows after meeting all operating expenses, reinvestment needs and taxes but prior to any payments to either debt or equity holders. The discount rate used is the weighted average cost of capital (WACC), which is the cost of the different components of financing used by the firm, weighted by their market value proportions (Damodaran, 2012).

According to Brealey et al. (2017), the free cash flow is the amount of cash that a firm can pay out to investors after all investments necessary for growth are paid. After discounting these free cash flows with the WACC, the present value of a firm can be determined. The WACC is the weighted average of the after-tax cost of debt and the cost of equity. The weights are based on the relative market values of the debt and the equity. Interest expenses are tax-deductible and therefore the cost of debt is calculated after tax.

The free cash flow to the firm is the available cash flow to the suppliers of the capital of the company after paying all operating expenses including taxes and the necessary investments in working capital and fixed capital are made (Pinto et al., 2015). The value of the firm can be estimated by discounting the free cash flows at the WACC.

The equation below can be used to determine the value of the firm (Damodaran, 2012).

$$\text{Value of the firm} = \sum_{t=1}^{n} \frac{FCFF_t}{(1+WACC)^t} \quad \textbf{(1)}$$

Where

n = Life of the firm.
$FCFF_t$ = Free cash flow to firm in year t.
WACC = Weighted average cost of capital.

We assume that a firm has an infinite life and that the cash flows of a firm grow at a constant rate, the stable growth rate, forever after a point in time. Therefore, the value of a firm can be determined by estimating the cash flows for a period and then estimating the value of the firm at the end of the period, which is called the terminal value (Damodaran, 2012). This can be taken into account in the formula for determining the value of the firm, where the second part of the formula represents the terminal value (Damodaran, 2012):

$$\text{Value of the firm} = \sum_{t=1}^{n} \frac{FCFF_t}{(1+WACC)^t} + \frac{FCFF_{n+1} / (WACC - g)}{(1+WACC)^n} \quad \textbf{(2)}$$

Where

n = Life of the firm.
$FCFF_t$ = Free cash flow to firm in year t.
WACC = Weighted average cost of capital.
g = Growth rate.

The terminal value could also be valued differently if the assumption is made that the firm will not have an infinite life. In this case, the liquidation value can be used as terminal value, which is determined based on the liquidation value of the firm's assets in the last year.

Another approach is to use multiples, which assumes the firm is an ongoing concern. In this approach, the terminal value of the firm is estimated by applying a multiple to the earnings or revenues of the firm in the final estimation year. The multiple used determines the value and therefore has to be selected carefully. Often this multiple is selected by looking at how comparable firms are valued. This method then becomes a mix of the discounted cash flow valuation and the relative valuation, but the objective is to estimate the intrinsic value of the firm. Therefore, using this approach for determining the terminal value is not consistent with the discounted cash flow approach being used for the valuation tool.

The discount rate used for determining the present value of the firm is the weighted average cost of capital. The weighted average cost of capital can be determined using the following formula (Brealey et al., 2017):

$$\text{WACC} = r_d(1 - T_c)\frac{D}{(D+E)} + r_e\frac{E}{(D+E)} \quad \textbf{(3)}$$

Where

r_d = Cost of debt.
r_e = Cost of equity.
T_c = The marginal corporate tax rate.
D = Market value of debt.
E = Market value of equity.

However, the cost of debt and the cost of equity have to be determined. The cost of debt is the interest rate on debt. The cost of equity, which is the expected rate of return on equity, can be estimated using the capital asset pricing model (CAPM). The formula of CAPM is as follows (Brealey et al., 2017):

$$r_e = r_f + \beta(r_m - r_f) \quad \textbf{(4)}$$

Where

r_e = Cost of equity.
r_f = The risk-free interest rate.
β = Beta.
$r_m - r_f$ = The market risk premium.

The different variables of the CAPM formula have to be determined. Damodaran (2012) describes that the risk-free interest rate is approximated by the rate of a long-term government bond and the market risk premium is the difference between the expected return on the market and the interest rate. This can be estimated using the historical premium or an implied premium. The historical premium compares the returns on equity with the return of a government security over a long time period. The implied premium estimates the risk premium based on equity prices. This has the advantage that it does not need historical data and it reflects the current market perceptions.
According to Damodaran (2012), the beta of the investment is the risk that is added by the investment to a market portfolio. Often this beta is estimated using historical price information, however this information is absent for private firms. Therefore there are three ways to estimate the beta of a private firm, which are accounting betas, fundamental betas and bottom-up betas.

When using the accounting betas approach, the beta is estimated by comparing the changes in the firm earnings on a quarterly or yearly basis to the changes in earnings for the market, this is done using regression. There are two limitations making this approach less appropriate. The first limitation is the amount of data for the regression available to estimate the beta, since the accounting earnings are often measured only once a year. This results in a regression with few observations and limited statistical power. The second limitation is that accounting earnings are often smoothed out and subject to accounting judgements, resulting in a mismeasurement of the beta.

The fundamentals betas is an approach where the beta is estimated based on the fundamentals of the firm. The beta of the firm is determined by the three variables, which are the type of business the firm is in, the degree of operating leverage of the firm and the financial leverage of the firm.

The bottom-up betas approach estimates the beta for a private firm by the weighted average of the unlevered betas of the businesses that the firm operates in. The beta for a private firm can be estimated by looking at the average beta of the companies in the same business. Differences in the financial and operating leverages are adjusted for the final value estimation. However, there is a problem with determining the beta using the debt-to-equity ratio, since this is a market value ratio. There are two alternatives for this problem. One alternative is to assume that the market debt-to-equity ratio of the private firm resembles the average for the industry. This results in the following formula, which can be used for estimating the beta (Damodaran, 2012).

$$\beta_{private\ firm} = \beta_{unlevered}(1 + (1 - tax\ rate)(\frac{industry\ average\ debt}{industry\ average\ equity})) \quad \textbf{(5)}$$

The other alternative is to assume that the private firm's target debt-to-equity ratio or optimal debt ratio can be used, which results in the following formula:

$$\beta_{private\ firm} = \beta_{unlevered}(1 + (1 - tax\ rate)(\frac{optimal\ debt}{optimal\ equity})) \quad \textbf{(6)}$$

The method for determining the beta will be the bottom-up approach. However, the reliability of this method depends on the availability of data about the betas of the industry.

In conclusion, the value of a firm can be determined by discounting the expected free cash flows to the firm at the WACC. However, when valuing a firm for an acquisition, some additional aspects should be taken into account. First, the motives for the acquisition should be defined and taken into account, since this affects the value of the firm. Then the existence of control and synergy should be added to the value of the firm. The safest way for valuation is to first determine the status quo value of the firm, and then adding the value for control and the value for synergy. The status quo valuation is the method of valuing a firm as explained in this section and can be seen as the value of the firm as a separate entity.

3.2. The economic value added method

The economic value added method estimates the value of a company by discounting the future excess cash flows and adding them to invested capital. To determine the economic value added each year, the following formula can be used (Damodaran, 2012):

$$\text{Economic value added} = \text{After-tax operating income} - (\text{Cost of capital} * \text{Capital invested}) \quad \textbf{(7)}$$

The after-tax operating income is already determined by the free cash flow to the firm model and can therefore also be applied when using the EVA method. However, the cost of capital is more difficult to determine, since each year the capital may change which should be adjusted for when determining the required return on capital. The capital invested can be determined using the previous year invested capital and subtracting the depreciation and adding the capital expenditures and changes in working capital of this year, which also can be obtained from the free cash flow to the firm model.

The firm value can be determined using the following formula, which is a modified version of the formula provided by Damodaran (2012):

$$\text{Firm value} = \text{Capital invested}_0 + \sum_{t=1}^{n} \frac{EVA_t}{(1+WACC)^t} + \frac{EVA_{n+1} / (WACC - g)}{(1+WACC)^n} + \frac{Change\ of\ capital\ invested}{(1+WACC)^n} \quad \textbf{(8)}$$

Where

n = Life of the firm.
EVA_t = Economic value added in year t.
WACC = Weighted average cost of capital.
g = Growth rate.

For determining the EVA of the terminal year an imputed capital invested is used. The imputed capital invested can be determined by dividing the after-tax operating income with the expected return on capital. The return on capital can be determined by dividing the growth rate with the result of dividing the sum of the depreciation, capital expenditures and changes in working capital with the after-tax operating income. The change of capital invested is determined to capture the change in capital between the imputed capital and the capital invested at the end of year ten. The change of capital invested is determined by subtracting the invested capital at the end of the year of the final year from the imputed capital invested.

3.3. Discounted cash flow and motives for acquisition

There are several motives for an acquisition which influence the method of valuing a firm. This section discusses some of them and discusses their effect on the valuation. The motives are the undervaluation of the firm, diversification, synergy, the value of control and the management self-interest. There could be multiple motives for doing an acquisition.

Undervaluation of the target firm

When a firm is mispriced by the financial markets, a firm can be a target for an acquisition. The value is the surplus that comes from the difference between the value of the firm and the acquisition price. However, to realise this strategy, the firm needs three components. The firm has to have the capacity to find a firm that trades at a lower price than its true value. The firm needs to have the funds to acquire the firm and it needs the skill in execution. Meaning that the firm has to be acquired for a lower price than the value in order to gain from it. This strategy works better for firms in less efficient markets and for private firms, since public firms trade in more efficient markets.

Diversification

Diversification reduces the firm-specific risk of investors. By acquiring firms in other businesses, the earnings volatility and risk can be reduced and potential value can be increased. However, there is some discussion about whether this diversification can be obtained more efficiently using the stock markets. For investors it is easier to diversify than for firms, therefore diversification can be seen as a dubious reason for a merger. Brealey et al. (2017) explain that diversification does not add value to the value of the combined companies under the condition that this happens in perfect markets and that the diversification opportunities of the investors are unrestricted.

There are two exceptions, in which diversification could have a benefit. In the case of a private firm, the owner of the firm is exposed to all the risk of the firm and therefore diversification could be an appropriate action. The second exception is a firm with managers who are heavily invested and involved. Diversification would be beneficial for them, since this reduces their exposure to total risk.

However, it is not the scope of this research to define what the value would be of the risk reduction through diversification. Especially since the potential firm to be acquired operates in the same sector making it not a totally different firm as the buyer.

Synergy

A potential for synergy can be a reason for doing an acquisition. Synergy is the potential added value from combining two firms. So, synergy exists when the value of the combined firm is greater than the sum of the firms operating independently. This concept is shown in the equation below. Brealey et al. (2017) explain that a merger creates synergies, which is added value, when the two firms combined are worth more than separately.

$$V_{AB} > V_A + V_B \quad \textbf{(9)}$$

Where

$V_{AB} = Value\ of\ the\ firm\ when\ firm\ A\ and\ B\ are\ combined$
$V_A = Value\ of\ the\ firm\ A$
$V_B = Value\ of\ the\ firm\ B$

There are two types of synergies, which are operating and financial synergies.
Operating synergies are synergies that could increase the operating income or the growth. There are several types of operational synergies which are:

- Economies of scale which could cause the firm to become more cost-efficient and profitable.
- Greater pricing power from reduced competition and higher market share which could lead to higher margins and operating income.
- The combination of different functional strengths is also called complementary resources (Brealey et al., 2017). Resources of both companies complement each other and therefore add value by combining them.
- Higher growth in new or existing markets is caused by combining a firm from an emerging market with a firm in an existing market. This can lead to increased sales.
- Economies of vertical integration are caused by the process of merging with a supplier or a customer. This is done to get more control over the production process. This is appropriate when two firms are highly dependent on each other (Brealey et al., 2017).

Financial synergies are synergies which could add value and take the form of higher cash flows or a lower cost of capital. The three types of financial synergies:

- A combination of a firm with excess cash and a firm with high-return projects can lead to a higher value of the combined firm. The excess cash is used to take on projects which otherwise could not be done. Brealey et al. (2017) describe that a firm with surplus funds and a shortage of good investment opportunities can merge with a company which does have the investment opportunities in order to redeploy its capital.
- Debt capacity could increase because the two firms combined can borrow more than they could as individual firms, creating a tax benefit in the form of higher cash flows or a lower cost of capital. They can borrow more because their earnings and cash flows could become more stable and predictable.
- Tax benefits which can come from the combined firm paying less taxes than the individual firms.

The different types of synergies can also be separated into other categories. For example, Koller et al. (2005) mention that there are two types, which are revenue and cost synergies. The are probably many more types of synergies that could be defined, however it is more important to know how to value these synergies. Therefore Section 3.5 describes the valuation of the synergies.

The value of control

Another reason for doing an acquisition can be the value of control. When a firm is not managed optimally, changing the management or management practices could lead to an increase in value of the firm, which is called the value of control.

Brealey et al. (2017) describe that firms with poor management are natural candidates for an acquisition. These firms do not exploit the opportunities to reduce cost and to increase their sales and earnings. By changing the management these opportunities can potentially be exploited resulting in a higher value of the firm.

There are three conditions in order to make the acquisition a success. First, the poor performance of the firm should be caused by the not optimally performing management. Second, after doing the acquisition there has to be a change in management or management practices to increase the value of the firm. At last, the market price of the firm should be based on the current situation under poor management and not reflect the value of control. Otherwise, the acquisition is not attractive since there is no premium to be earned by the acquiring firm.

Management self-interest

In most of the acquisitions, the manager of the acquiring firm decides whether to carry out the acquisition and also the price for the firm to be acquired. Sometimes the reason for doing an acquisition is not value maximisation of the firm but the acquisition is done for managerial self-interest.

Managerial self-interest can have different motives for the acquisition. The motive empire building is when the interest of managers is to make the firm the largest and most dominant firm in their industry or market. Managerial ego is a motive when there are multiple bidders and the acquisitions become a test of machismo. The managers would not like to lose even when winning the bidding could cost the firm a lot of money. Compensation and side benefits are other motives and can occur when an acquisition results in a rewriting of management contracts. In the case that the potential private gains for the managers are large from doing an acquisition, this can lead to unnecessary costs for the firm.

3.4. Value of control

As explained before, the value of the firm can be determined by adding the value of synergies and control to the status quo valuation. The value of control is created by changes made in current management policies. For example, assets can be acquired or liquidated, the financing mix can be changed or the firm can be restructured. If these kinds of changes can be identified, then the value of control can be determined. The equation used to determine the value of control is:

$$\text{Value of control} = \text{Value of firm with new management} - \text{Value of firm with current management} \quad \textbf{(10)}$$

So, to do this, the value of the firm has to be determined with current management and the value of the firm has to be determined using the assumptions about the changes and their effects that the new management would make after the acquisition.

3.5. Synergies

The value of the synergies can also be added to the status quo valuation to determine the final value of the firm. Synergies can have several forms as explained before and can be divided into operational and financial synergies. However, the total value of the synergies is determined, meaning that the effect of all the synergies is combined when valuing the firm.

Valuing the synergy can be done by making assumptions about the form of the synergy and the moment when the synergy will affect the cash flows. The form of the synergy determines which of the four inputs of the valuation will be influenced. The inputs are the cash flow from existing assets, higher expected growth rates, a longer growth period or a lower cost of capital. Since the present value of the cash flows created by the synergy determines the value of the synergy, the moment that the cash flow is affected is also of importance.

The value of the synergy can be determined using the following equation:

$$\text{Value of synergy} = \text{Value of combined firm with synergy} - (\textit{v}\text{alue of target firm} + \text{value of bidding firm}) \quad \textbf{(11)}$$

So, when the firms are combined synergies are created, the synergies can be valued by subtracting the two separate firms which do not have synergies from the combined firm.

After determining the value of the synergies it can be added to the status quo valuation and control value to determine the final value of the firm. Then the price to be paid for the target firm has to be determined given the value of the firm. The value of the firm represents a maximum price that can be paid. This does not mean that this amount has to be paid, it also can be less than this amount. If the buyer pays the full amount, there is no surplus to claim the value of the synergy and control. The amount to be paid for synergies also depends on which firm is indispensable for creating the synergy and control value. If it is the target firm, then it is reasonable to pay up to the value of the synergy. However, if it is the buying firm then it is not.

3.6. Goodwill

Goodwill represents the difference between the adjusted book value of equity of the firm and the acquisition price of the target firm. This difference consists of the difference between the book value of assets and the market value and the acquisition premium, which is the price paid for the synergy and control. The firm records goodwill when the price paid for the acquisition exceeds the book value of the target firm (Koller et al., 2005). According to Pinto et al. (2015) goodwill is an intangible asset that represents the excess of the price paid for the acquisition of the firm over the value of the net identifiable assets.

Goodwill can be determined by subtracting the book value of the assets from the acquisition price paid. This means that the value of the goodwill should not exceed the market premium and acquisition premium, otherwise more is paid than the value of the firm.

4. Factors having impact on the acquisition value

Section 4.1 explains the sector characteristics and their influence on the valuation. In Section 4.2 and 4.3 we discuss the different factors influencing the valuation methods, which is done by looking at the effect on the free cash flows to the firm and the weighted average cost of capital. After that, we discuss the impact of tax conditions on the valuation in Section 4.4. Section 4.5 discusses how to cope with the uncertainty in factors impacting the valuation.

4.1. Company vehicles sector characteristics

The sector in which the company operates plays an important role in the valuation. A lot of input parameters and assumptions made rely on the characteristics of the sector of the company. Before discussing their effects on the valuation it is better to explain what these characteristics are and what they are expected to mean for the company in the future. The following list of factors influencing the valuation will be discussed:

- The macroeconomic influences.
- The types of goods.
- Capital-intensive.
- Financial leverage.
- Technological influences.
- Governmental influences.

The sector in which Company X operates is the Transport and Logistics sector. Within this sector the industry of company vehicles can be defined. However, the available data on the specific industry of company vehicles is limited, therefore some information is used from the more general Transport and Logistics sector.

To describe the industry, or in this case the sector, the elements needed for an industry analysis mentioned by Pinto et al. (2015) are used. This looks at the internal and external factors influencing the industry of a company. The internal factors affecting the industry are the barriers to entry, industry concentration, industry capacity, market share stability, industry life cycle and price competition. The external factors influencing the growth, profitability and risk of the industry are macroeconomic, technological, demographic, governmental and social influences. The relevant factors will be discussed, which are the factors that are considered to have a significant impact on the valuation of the company.

The macroeconomic influences

The macroeconomic influences are trends in the overall economic activity that have a significant effect on the demand for products or services of an industry. The trends can be cyclical or structural. Some of the economic variables that affect the revenue and profits of the industry are the gross domestic product (GDP), interest rates, the availability of credit and inflation. According to Damodaran (2009), the valuation of all companies are affected by macroeconomic variables, however the magnitude of the effect may be different across companies. The growth rate of the economy is of importance because when valuing companies, estimations are made about the growth in revenues, income and cash flows over time. This is based on the companies specific prospects, however these are influenced by the state of the economy. Also, the expected inflation and exchange rates for the future should be taken into account when estimating the value of a company.

Taking this into account, the valuation should incorporate the current and expected future state of the economy.

The Transport and Logistics sector is strongly influenced by the state of the economy. Meaning that when the global economy is doing not well, this will affect the Transport and Logistic sector. However, when the economy is doing better, the sector will also be doing better. This effect is often not immediately noticeable, but with some short delay. This then also affects the industry of company vehicles. An interesting characteristic of this sector is that the firms are cyclical, meaning that their earnings and cash flows follow the state of the economy (Damodaran, 2012). According to Koller et al. (2005), scenario analysis can be used to value these cyclical companies. Besides, cyclical firms tend to be high-beta firms (Brealey et al., 2017). This characteristic means in particular for the companies in the sector that when the economy is doing worse, the revenue decreases but the earnings before interest, taxes, depreciation and amortization (EBITDA) margin seems to increase (personal communication, 30 April 2021). Since the company sells trucks and does maintenance on trucks, their EBITDA margin can change over time. When the economy is doing worse, the number of trucks sold decreases, because the clients of the sector often do not want to do large investments in trucks, therefore they delay their purchase of new trucks and instead they have to do additional maintenance since their trucks have a longer period of usage requiring more maintenance. The EBITDA margin on maintenance is higher than the EBITDA margin on the sales of trucks, therefore the overall EBITDA margin increases. When the economy is doing better, the sales of trucks increases but the EBITDA margin decreases, since relatively new trucks do not require that much maintenance. However, in the future these newly sold trucks do also need maintenance, resulting in a delayed increase in maintenance compared to the increase in sales on trucks.

This behaviour of the EBITDA margin in relation to the state of the economy is difficult to predict. However, it can play an important role in the valuation. This can especially be the case when the state of the economy is predicted to become worse in the next years. Therefore, this research tries to take this relation into account, which will be discussed in Section 4.2.

The types of goods

The goods sold in the industry can be seen as necessity goods. The reason for this is that transportation by truck is always necessary regardless of the state of the economy. However, since other industries are more affected by the state of the economy, it indirectly affects the company vehicles industry. Because when the economy slows down, the amount of goods to be transported decreases and therefore the number of trucks demanded also decreases. The opposite applies when the economy grows.

An economic slowdown causes that the purchase of trucks is delayed, but this is compensated for by the increased demand in maintenance. Therefore, the investment in a new truck can be seen as a more luxury good and the maintenance is more a necessity good. Depending on the state of the economy, the choice between the two is made.

So, the earnings and cash flows follow the state of the economy. However, the total revenue is rather stable, since the sales and the maintenance both contribute to the trucks that are necessary for the transportation required by the economy.

Capital-intensive

Another important characteristic of the sector is that the companies are very capital-intensive, meaning they need a lot of capital to run their business. The companies have a relatively high amount of fixed assets, such as buildings and equipment.

This means that they have a high level of operating leverage, which is the ratio of fixed costs compared to their variable costs (Brealey et al., 2017). To be able to cover this, they need a high volume of sales. This also means that small changes in sales can result in relatively large changes in profit. Having relatively high fixed costs makes the companies in the industry vulnerable to the decreases in sales

caused by for example the state of the economy, because they still have to pay their fixed costs. According to Brealey et al. (2017), a high operating leverage means a high beta.

However, a benefit of being capital-intensive is the barrier to entry for other companies, since it requires large amounts of investment to enter the industry.

Financial leverage

Also, they often have a lot of financial leverage. The reason for this is that they need a lot of capital to finance the purchase of these assets. This is often financed using large amounts of debt resulting in a higher financial leverage. A higher financial leverage results in a higher beta for the firm (Damodaran, 2012).

Technological influences

Furthermore, there are technological influences, which are new technologies that create new or improve products that can change an industry radically. This is important to take into account for the valuation, since there is a possibility that the industry will change caused by the development of electric and hydrogen vehicles (Innovam & BOVAG, 2014). However, how this will affect the revenues and costs of the company is difficult to estimate. It is expected that large investments are needed in order to transfer companies to a future with the use of electric vehicles (Heid et al., 2017). For example, investments in infrastructure at companies and high-educated people are needed for the maintenance of electric vehicles. These future costs should be taken into account in a valuation when expecting this change to actually occur.

Governmental influences

Additionally, governmental influences could also play a role in the growth, profitability and risk of the industry. Governments can set rules or provide subsidies to influence the revenues and profits of an industry. For example, the government is stimulating the industry to use electric or hydrogen trucks to become more sustainable. They do this by providing subsidies to buy electric trucks (Rijksoverheid, 2021). Another action is the increasing regulation on the use of diesel trucks (Tryggestad et al., 2017). This will influence the market of company vehicles. The current revenue created from diesel trucks or other fuel trucks could be negatively influenced by the subsidies for electric vehicles. This should be taken into account in the valuation, since the market is influenced by this governmental action. In the future these subsidies might be stopped, resulting in a potential increase in non-electric trucks. It could also be that the market demand is shifted caused by these subsidies, meaning that the demand for electric vehicles increases even more. These possibilities should be considered when forecasting future revenues in order to make an estimation of the value of the company. In the entire transport and logistics sector becoming more sustainable is increasingly important. This effect on the valuation should be considered.

These sector characteristics play a role in the multiples, since these are based on comparable firms operating in the same industry. The sector of the company tells a lot about the key drives, risks and opportunities (Rosenbaum & Pearl, 2013). The characteristics also impact the discounted cash flow valuation and the economic value added method, since the input variables are linked to them.

4.2. Factors influencing the free cash flow to the firm

As explained before, the value of a company is determined by discounting the free cash flow to the firm at the WACC. There are several factors that influence the final value of a company when looking at the free cash flow to the firm in particular. These will be discussed separately to get an understanding of the risks of estimating these variables. The following factors influencing the free cash flow to the firm will be discussed:

- The revenue and cyclicality.
- The revenue synergies.
- The cost synergies.
- The revenue growth rate.

The free cash flow to the firm for each year can be determined with the following equation (Damodaran, 2012):

$$FCFF = EBIT(1 - tax\ rate) + Depreciation - Capital\ expenditure - \Delta Working\ capital \quad \textbf{(12)}$$

The revenue and cyclicality

The earnings before interest and taxes (EBIT) can be determined by subtracting the costs and depreciation from the revenue. The costs are often determined using the EBITDA margin. Therefore, the revenue is an important factor influencing the free cash flow to the firm. The estimation of the revenue depends on several things. As explained in the previous section, the sector characteristics influence the revenue by for example the firm being cyclical. This influences the free cash flows to the firm, because the revenue and the EBITDA margin differ during years and therefore the EBIT differs. The two revenue streams are the sales of trucks and the maintenance of trucks. Both have their own EBITDA margin, which can slightly change over years, but are assumed to be stable. However, the economy causes the shift in demand for the two types, causing that the average EBITDA margin shifts. This results in different free cash flows to the firm.

The shift in demand is caused by the state of the economy and therefore should be linked to each other. So, when the economy is doing well the assumption can be made that the revenue growth rate is positive, since more trucks will be sold, however the EBITDA margin will then decrease. This relationship will be modelled in the valuation tool and in Section 5.3 will be explained how this is done.

The revenue synergies

Another factor influencing the revenue is the revenue synergies. The revenue synergies should be estimated carefully, since these are difficult to realise. In just half of the acquisitions more than 70 percent of the targeted revenue synergies is realised and in one-quarter of the acquisitions less than 30 percent is realised (Koller et al., 2005).

The cost synergies

Another important factor is the cost synergies. The costs consist of the cost of goods sold and the direct and indirect overhead costs. The cost synergies also affect the total costs made by the company. In comparison to the revenue synergies, the cost synergies are more often realised. In 88 percent of the acquisitions more than 70 percent of the estimated cost synergies is realised (Koller et al., 2005). The total costs are also affected by the implementation costs for capturing the synergies and should not be underestimated. Also, the time required to capture and the timing itself should not be underestimated. When synergies are not captured quickly, they may not be captured at all (Koller et al., 2005).

Subtracting the costs from the revenues results in the EBITDA, which also serves as an input for the multiples. Then the depreciation is subtracted to determine the EBIT. The EBIT is an important factor for determining the FCFF, since it is often the largest part of the value. The EBIT is multiplied by one

minus the tax rate in order to subtract the taxes. Since the taxes have a strong impact on the EBIT and therefore the FCFF it will be discussed separately in Section 4.4.

The revenue growth rate

Next to the free cash flows to the firm that are projected on a yearly basis, the terminal value has to be determined. This is done by taking a free cash flow to the firm into perpetuity, which assumes the cash flow to grow at a constant rate forever. However, the selection of this cash flow and growth rate is rather important. The reason for this is that this cash flow is seen as the cash flow that will be realised for every future year, so when this is not the case this has a large impact on the valuation. The same applies to the growth rate, which determines at what rate the cash flow will grow in the future. This growth rate depends on the growth rate of the economy, since the stable growth rate cannot exceed the growth rate of the economy (Damodaran, 2012). Therefore, the economic conditions and sector characteristics play a role on the free cash flows and especially on the terminal value. Meaning that when valuing the company, the expected future state of the economy should be incorporated when determining the growth rate, which requires difficult estimations.

So, a lot of uncertainty comes with the terminal value making it a risky part of the valuation. The terminal value requires careful attention because it is often a majority of the company's value and especially about the growth rate and profitability assumptions that drive the terminal value (Brealey et al., 2017). The growth rate has to be carefully estimated, since small changes can produce relatively large changes in the terminal value and therefore the total firm value (Bruner & Perella, 2004).

Several factors play a role in the free cash flow to the firm, especially the synergies that are expected. Also, the sector characteristics affect the revenues and costs. The growth rate influencing the terminal value is of importance because of its relatively large impact on the total valuation. These factors are all important and should be identifiable in the tool, in order to see their particular effect on the valuation.

4.3. Factors influencing the weighted average cost of capital

The free cash flows to the firm have to be discounted using the weighted average cost of capital to determine the value of the company. However, several factors influence the discount rate. Since all free cash flows to the firm are affected by the WACC it has a high impact on the value. The following factors will be discussed:

- The risk-free rate.
- The market risk premium.
- The Beta.
- Financial leverage.
- The cyclicality and the operating leverage.

For determining the value of the WACC, as mentioned before, Equation 3 is used:

$$\text{WACC} = r_d(1 - T_c)\frac{D}{(D+E)} + r_e\frac{E}{(D+E)} \quad \textbf{(3)}$$

To determine the cost of equity for this equation, the CAPM formula can be used:

$$r_e = r_f + \beta(r_m - r_f) \quad \textbf{(4)}$$

To understand which factors influence the WACC, some of the different components of the WACC will be discussed with the factors influencing these components.

The cost of debt is based on the interest rate on the debt. The interest rate can be obtained by looking at the rate charged to the firm for their latest borrowings (Damodaran, 2012). However, in the current economic conditions the interest rate is extremely low, this influences the value of the WACC. If the cost of debt changes in the future, then the value of WACC could also increase. So, it is important for determining the WACC, to know the current rate at which the firm can borrow.

The cost of equity is the hardest part of calculating the WACC (Brealey et al., 2017). To do this, the risk-free rate, the beta and market premium are required.

The risk-free rate

The risk-free rate is based on the yield of a long-term Dutch government bond as mentioned before. However, the choice of the rate directly influences the cost of equity and should therefore be carefully considered.

There are different views on how to establish the risk-free rate. KPMG (2020) describes that there are no investments without risk. The risk-free rate is commonly approximated by looking at the yield on a long term debt instruments issued by a government that is likely to be financial healthy, such as an AAA-rated government bond with a maturity of 30 years. According to Koller et al. (2005), the risk-free rate can be estimated by looking at government default-free bonds. The duration should be based on the duration of cash flows. However, due to illiquidity of 30-year bonds, a 10-year bond is preferred. Besides, it is important to use local government bonds for estimating the risk-free rate. Pinto et al. (2015) describe that if a 20-year bond is available and trades in a liquid market, it also can be used. The general purpose is to use an instrument which matches the expected lifetime of the company, which assumes an ongoing concern. However, practical considerations should also be taken into account. Therefore, a shorter-term government bond, such as a 10-year government bond could be used instead of a 30-year bond (Rosenbaum & Pearl, 2013).

Furthermore, the discounted cash flow method used for the valuation includes a terminal value that represents the value of cash flows into perpetuity, meaning it is assumed that the cash flows will be earned for an infinite period of time. Therefore, a risk-free rate has to be used to represent that duration, which is done with a government bond with the longest maturity (Damodaran, 2012).

So, the risk-free rate that will be used is based on the yield of a 30-year Dutch government bond. Because it represents the duration of the cash flows.

The market risk premium

The market risk premium cannot be estimated exactly (Brealey et al., 2017). This value is not affected by the company itself, since it is based on the difference between the required return on the market and the risk-free rate. However, the country-specific risk could be added to the market risk premium to cover the additional risk for investing in a specific country, but this is not further discussed since the country-specific risk for the Netherlands is zero.

The beta

To incorporate firm-specific conditions, the beta is used. The beta takes into account the riskiness of a firm relative to the market (Damodaran, 2012). The beta is more difficult to estimate and to do this the bottom-up approach is used. This method uses the unlevered beta, which is based on the comparable firms of the industry. However, these firms are not exactly the same, meaning that the risk profile probably is slightly different. Determining the unlevered beta is difficult since the amount of available information on betas of comparable firms is very limited, meaning that an unlevered beta from a public source has to be used and the assumption has to be made that this beta represents the industry in which the company operates. However, there will be differences between the companies used to determine the unlevered beta. To cope with this problem, the formula takes the differences in financial and operating

leverage into account with the debt-to-equity ratio, but this probably does not capture all the specific risk of the company since there will be more differences between the companies selected for determining the unlevered beta for the industry.

As explained in Section 4.1, the firms in the industry are capital-intensive and have a high operating and financial leverage. These sector characteristics play a major role on the WACC.

Financial leverage

To finance the required capital, often a large amount of debt is used. This results in a high financial leverage, which is reflected in the level of debt compared to equity. This directly influences the WACC, since the debt is a major part of the total capital. Therefore, the weight of the cost of debt is more than that of the cost of equity.

The cyclicality and the operating leverage

Furthermore, the cost of equity, which is determined by the CAPM formula is also affected. The cyclicality of the firm and the operating leverage affect the unlevered beta of the firm, which influences the value of the cost of equity. Being a cyclical firm and having a high operating leverage result in a high unlevered beta. The levered beta, which is based on the unlevered beta and the financial leverage is also high, caused by the high financial leverage. This results in a high cost of equity and therefore a high WACC.

So, when levering the beta with the debt-to-equity ratio, the value of the ratio used is relatively high. However, since this is the case for the whole industry, this is taken into account in the value of the unlevered beta.

As explained before, two types of debt-to-equity ratios can be used to determine the levered beta for the private firm, which are needed since a market debt-to-equity ratio should be used. To solve this, the assumption can be made that the market debt-to-equity of the firm will resemble the average of the industry or to use the private firm target debt-to-equity ratio. However, both methods bring along uncertainty. By assuming that the debt-to-equity ratio of the firm is the same as the industry average, the assumption is again made that the company is comparable with the industry. This will be true to a large extent, however there will still be some differences which are not compensated for. The other assumption is to use the target debt-to-equity ratio or an estimated optimal debt-to-equity ratio. In this case, it is not taken into account that the possibility exists that the current debt-to-equity ratio can be biased since the company could present itself as a more valuable company.

In both situations this means that the actual beta could be slightly higher or lower, resulting in a different WACC. So the beta is an estimation of the companies specific risk relative to the market, however using the method of the bottom-up approach and the amount of available data there is still uncertainty about what the exact value of the beta is, which should be considered when valuing the firm. The uncertainty that comes with selecting comparable companies is difficult to tackle since this comes down to the choices of the analyst regarding a company being comparable or not.

The debt-to-equity ratio plays a role in determining the beta, but it also plays a role in the WACC formula itself, causing it to have even more impact on the WACC. The debt-to-equity ratio should therefore carefully be estimated and be the same in both formulas. In the case that the target firms current debt-to-equity ratio is different than the target debt-to-equity ratio, the target ratio has to be used, otherwise it can result in a biased estimation of the value of the company.

The tax costs also affect the value of the WACC. Since the tax affects several parts of the valuation, we discuss it separately in the next section.

4.4. Tax conditions influencing the valuation

The tax conditions that apply have an effect on two major parts of the valuation, which are the free cash flows to the firm and the WACC. The WACC is affected by the tax rate, indirectly affecting all cash flows when discounting them. The cost of debt is multiplied with the debt to total value ratio, but not taking into account the tax rate. So, a higher tax rate results in a lower WACC.

Also, the tax rate affects the free cash flows to the firm directly. Since the free cash flows to the firm are calculated by subtracting the amount of tax from earnings before interest and taxes and adding the other components, the tax rate plays a large role.

Furthermore, in the Netherlands additional tax rules apply causing that the interest expenses may be deducted from the earnings before interest and taxes before determining the amount of taxes to be paid. However, this benefit may be applied to determine the net result but not for determining the free cash flows to the firm. The reason for this is that the tax benefit is already considered by the WACC, since this takes the after-tax cost of debt into account. By including this tax benefit when determining the free cash flows to the firm, it would double count the benefit (Damodaran, 2012).

In addition, by increasing the amount of debt, the firm can create a tax benefit. Since the interest expenses may be deducted before determining the amount of tax to be paid, a higher debt can cause higher interest expenses which lead to a lower tax burden (Damodaran, 2012). This results in a lower WACC and therefore an increased value of the firm. However, the combination of two firms enables the increase in debt, since their combined earnings may become more stable and predictable. Because this benefit only exists after the acquisition it can also be considered as a financial synergy and therefore does not play a role in the value of the firm as a separate firm.

A similar tax benefit can be created by increasing the depreciation charges after an acquisition the tax burden will be reduced, which will also increase the value of the firm. However, amortization on goodwill is not tax deductible (Damodaran, 2012).

Additionally, another important tax condition to consider is the tax rule about net operating losses (NOL) of previous years which can be carried forward in time to shield the income in future periods from taxes (Damodaran, 2012). When determining the amount of tax to be paid, the net operating loss of the previous year may be subtracted from the operating income of the current year to compensate for the loss of last year. This effect causes that when a firm made a loss in the last year and in the current year makes a profit, the cash flow can be higher since less tax has to be paid and therefore increases the value of the company. Following this rule, a financial synergy can be created when a profitable firm acquires a firm that makes losses because it may use the net operating losses of that firm to reduce its tax burden (Damodaran, 2012).

In conclusion, the tax rate and rules have a relatively large impact on the valuation through the cash flows and the WACC. However, the tax rate is fixed meaning that it is a given condition which can almost never be changed unless special tax rules can be arranged with the Dutch tax authorities.

4.5. Uncertainty in valuation

The information used to value a company comes with uncertainty. Additionally, it is not always clear how a factor influences the value of the firm. So given the fact that a factor with an uncertain value has an influence, it is uncertain how and to which extent this factor influences the value. It is important to take this into account when valuing the company, since this can have a large impact. Valuation of companies comes with a significant degree of uncertainty, regardless of the method used. Because valuation of companies involves making assumptions about the future, which is inherently uncertain (Pinto et al., 2015).

It is important to know what the effects are of slight changes in the input data and assumptions to be able to understand how appropriate an estimation of the value is. If there is a slight change, the effect on the value has to be known. For example, if the growth rate of the company is 1% higher, what would this mean for the value of the company. To cope with that, the robustness of the valuation tool has to be checked. By looking at the assumptions made and their effect on the valuation, a better understanding of their role in the valuation can be created.

Next to understanding whether the assumptions made are appropriate, it is interesting to see what happens when an input variable takes a slightly different value. To test this a sensitivity analysis can be performed, which considers the value of the company when one variable is changed to an optimistic or pessimistic value (Brealey et al., 2017). By doing this for several variables, those that have a large impact on the value can be identified.

One limitation of this method is to determine what that optimistic or pessimistic value of the variable should be, which is based on the interpretation of the analyst. Another limitation is that the underlying variables that are changed are likely to be interrelated (Brealey et al., 2017). These kinds of more extreme situations have to be taken into account. For example, in the situation that none of the assumed synergies are realised but that expenses and efforts are made for them. This would then lead to a reduction in expected revenues but also to a cost increase, meaning that multiple variables are changed which all affect the value of the company.

To take these kinds of extreme situations into account scenario analysis can be performed. This looks at the value of a company under situations where several variable values are different at the same time (Brealey et al., 2017). So, for example in the case of multiple assumptions being wrongly estimated. By changing multiple assumptions simultaneously and repeating this for a variety of different assumptions about the future, a range of different value estimates can be determined (Pinto et al., 2015). The range of values across different scenarios is the most valuable information from a scenario analysis, because it provides an indication of the riskiness of the asset or the company (Damodaran, 2012).

In the development of the tool, the sensitivity analysis and the scenario analysis are taken into account. Since some variables are interesting to investigate separately but combinations of changing variables are also of importance because these are likely to occur as well.

The uncertainty in the input data has an effect on all different valuation methods. For example, by estimating an increase in the profit margin caused by a cost reduction, the profit of the company will increase. This results in higher cash flows, but also to a higher return on equity. For all valuation methods this would lead to a higher valuation. However, if this cost reduction is estimated wrong this higher valuation is not correct. Understanding which inputs play a role and their impact on the valuation is of importance for the reliability of the valuation.

5. Tool development

We provide a general explanation of the tool and its goal in Section 5.1. We explain the input part of the tool with the use of questions and answers in Section 5.2. In Section 5.3, the additional data needed as input are described and also how these data are obtained and incorporated in the valuation support tool. Section 5.4 describes the calculation of the different scenarios in more detail. The output of these scenarios is given in Section 5.5.

5.1. Tool description

The valuation tool consists of three parts, which are the input, the calculations and the output. A screenshot of the tool is shown in Appendix A. The input consists of two parts, the first part of the input is in the form of a question and answer box, in which questions are asked about the current and future situation of the company for each scenario. The other part is the input data that are already incorporated in the tool. The answers to these questions and the other input data form the basis for the calculations. In the calculation part, the different scenarios are calculated and for each scenario a calculation is done on a separate sheet. The results of these scenarios are combined and are showed in the output. The output part summarises the results of the different scenarios and shows graphs in order to visualize and compare the different outcomes.

Furthermore, since some of the input variables are less predictable than others a sensitivity analysis is performed on three important variables to show their impact on the value of the firm, which are the growth rate, the EBITDA margin and the WACC. The reason for selecting these three variables is their difficulty to estimate and their relatively large impact on the valuation. The sensitivity analysis is done based on the basis scenario and the result of this is shown on the calculation sheet and the output sheet.

5.2. Questions and answers for input

The first and largest part of the input is the answer and questions box, which is shown in Figure 1. The answer and question box is developed to capture as much as possible specific information about the company. So, the questions are formulated to be as effective as possible. This means the questions try to obtain as much information as possible, preventing that too many questions have to be answered. The answers that are given are linked to the different calculation sheets for the corresponding scenarios.

Questions		Answers			
What is the company name?	**Company name**	**Company Y**			
	Scenario:	**Basis**	**Scenario 1**	**Scenario 2**	**Scenario 3**
	Description:	*Basis scenario*	*Higher economy growth*	*Lower economy growth*	*Lower EBITDA*
Information about recent year	**Input values * 1000€**				
	Tax rate	25%	25%	25%	25%
What is the amount of equity?	**Equity**	50	50	50	50
What is the amount of debt?	**Debt**	150	150	150	150
What is the cost of debt?	**Cost of debt**	5.00%	5.00%	5.00%	5.00%
What is the unlevered beta for the **industry**?	**Unlevered beta**	1.01	1.01	1.01	1.01
	Cost of equity	19.37%	19.37%	19.37%	19.37%
	Risk-free rate	0.50%	0.50%	0.50%	0.50%
	Market risk premium	5.75%	5.75%	5.75%	5.75%
	Beta	3.28	3.28	3.28	3.28
	WACC	7.66%	7.66%	7.66%	7.66%
What are the most recent year revenues?	**Revenue**	100	100	100	100
	Costs	-86	-86	-86	-89
What is the EBITDA margin?	EBITDA margin	*13.76%*	*13.76%*	*13.76%*	11.00%
	EBITDA excl synergies	13.76	13.76	13.76	11
	Revenue synergies	0	0	0	0
	Cost synergies	-5	-5	-5	-5
	EBITDA after synergies	8.76	8.76	8.76	6
	EBITDA margin after synergies	8.76%	8.76%	8.76%	6.00%
What is the most recent year depreciation	**Depreciation**	-1	-1	-1	-1
	Operating income or EBIT	7.76	7.76	7.76	5
	Interest expensens and income	-7.5	-7.5	-7.5	-7.5
	EBT	0.26	0.26	0.26	-2.5
	Tax	-0.07	-0.07	-0.07	0
	Net result	0.20	0.20	0.20	-2.5
Are the capital expenditures the same as the depreciation?		Yes	Yes	Yes	Yes
If not, what are the capital expenditures?	**Capital expenditures**	-1	-1	-1	-1
What is the working capital as percentage of the revenue?	**Changes in working capital**	12.5%	12.5%	12.5%	12.5%
	FCFF	18.32	18.32	18.32	16.25
What are the losses from previous years that may be carried forward?	Net Operating Losses	0	0	0	0
Upcoming years (1 - 5)					
Growth rate of Economy?	GDP growth rate	2%	3%	-1%	1%
Growth rate of Revenue?	Growth rate	2%	3%	-1%	1%
Will the EBITDA margin be the same as recent year?		Yes	Yes	Yes	Yes
If not, what will be the EBITDA margin?	EBITDA margin	62.50%	62.50%	62.50%	62.50%
Will the growth rate of the depreciation be the same as revenues?		Yes	Yes	Yes	Yes
If not, wat will be the growth rate of depreciation?	growth rate depreciation	2%	3%	-1%	1%
	Interest expenses	-7.5	-7.5	-7.5	-7.5
Will the capital expenditures be the same as the depreciation?		Yes	Yes	Yes	Yes
If not, wat will be the capital expenditures?	Capital expenditures	-100	-100	-100	-100
Will the working capital be the same percentage of the revenue as recent year?		Yes	Yes	Yes	Yes
If not, what will be the working capital as percentage of the revenue?	changes in working capital	15.00%	12.50%	12.50%	12.50%
	Revenue synergy year 1	0	0	0	0
	Revenue synergy year 2	0	0	0	0
	Revenue synergy year 3	0	0	0	0
	Revenue synergy year 4	0	0	0	0
	Revenue synergy year 5	0	0	0	0
	Cost synergy year 1	-5	-5	-5	-5
	Cost synergy year 2	-5	-5	-5	-5
	Cost synergy year 3	-5	-5	-5	-5
	Cost synergy year 4	-5	-5	-5	-5
	Cost synergy year 5	-5	-5	-5	-5
Stable period (6 - perpetuity)					
Growth rate of Economy?	GDP growth rate	1%	2%	1%	1%
Growth rate of revenues?	Growth rate	1%	2%	1%	1%
Will be the EBITDA margin be the same as in year 5?		Yes	Yes	Yes	Yes
if not, what will be the EBITDA margin?	EBITDA margin	0.00%	0.00%	0.00%	0.00%
	Revenue synergies	0	0	0	0
	Cost synergies	-5	-5	-5	-5
Will the growth rate of the depreciation be the same as revenues?		Yes	Yes	Yes	Yes
If not, wat will be the growth rate of depreciation	growth rate depreciation	1%	2%	1%	1%
	Interest expenses				
Will the capital expenditures be the same as the depreciation?		Yes	Yes	Yes	Yes
If not, wat will be the capital expenditures	capital expenditures	-100	-100	-100	-100
Will the working capital be the same percentage of the revenue as last 5 years?		Yes	Yes	Yes	Yes
If not, what will be the working capital as percentage of the revenue?	changes in working capital	20.00%	12.50%	12.50%	12.50%
Acquisiton price					
Bookvalue		50			
What is the amount of goodwill to be paid?		20			
Acquisiton price		70			
What are the average multiples of **industry**					
EV/EBITDA		4			
EV/EBIT		3			
EV/Sales		2			
What are the average acquisition price multiples of **industry**					
Multiple Acquisition price/EBITDA		4			
Multiple Acquisition price/EBIT		3			
Multiple Acquisition price/Revenue		2			

Information	Fill in values
	Do not fill in values
	Values do not match base scenario

What are the expected revenue and cost synergies?

Synergies							
Year	Basis	1	2	3	4	5	6 - perpetuity
Revenue							
Reason 1	0	0	0	0	0	0	0
Reason 2	0	0	0	0	0	0	0
Reason 3	0	0	0	0	0	0	0
Reason 4	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Cost							
Reason 1	0	0	0	0	0	0	0
Reason 2	0	0	0	0	0	0	0
Loan expenses	-5	-5	-5	-5	-5	-5	-5
Reason 4	0	0	0	0	0	0	0
Total	-5	-5	-5	-5	-5	-5	-5

FIGURE 1: THE INPUT PART OF THE TOOL.

Furthermore, the questions are developed using information about the sector characteristics, such that these could be incorporated into the tool. For example, when determining the beta the unlevered beta of the sector is asked, which is specific for the industry. Some of the questions are formulated in a way that the cyclicality of the revenues and costs can be taken into account.

Figure 1 shows that several questions have to be filled in. In addition to that, this has to be done for multiple scenarios. However, this is the only way to incorporate the amount of specific changes without losing the overview of the differences between the scenarios, since fewer questions would lead to less specific inputs. Also, many changes are made over different years, which is not able to capture with for

example Excel scenario manager in combination with presenting the results of different scenario's in multiple graphs. Therefore, the design choice was made to create a system which could incorporate the different scenarios and presenting their results combined.

There are three parts within the question and answers input, these are created to make a distinction between the different periods in which a company can place itself. Each part has its own questions, however several questions are repeated in each part since this information is necessary for each period. For each part some of the questions are discussed below in order to explain their necessity for the valuation tool. The questions that are asked are similar to the questions asked in other valuation models. Also, the questions are intuitively logical.

Current situation questions

Questions		Answers			
What is the company name?	**Company name**	**Company Y**			
	Scenario:	**Basis**	**Scenario 1**	**Scenario 2**	**Scenario 3**
	Description:	*Basis scenario*	*Higher economy growth*	*Lower economy growth*	*Lower EBITDA*
Information about recent year	**Input values * 1000€**				
	Tax rate	25%	25%	25%	25%
What is the amount of equity?	**Equity**	50	50	50	50
What is the amount of debt?	**Debt**	150	150	150	150
What is the cost of debt?	**Cost of debt**	5.00%	5.00%	5.00%	5.00%
What is the unlevered beta for the **industry**?	**Unlevered beta**	1.01	1.01	1.01	1.01
	Cost of equity	19.37%	19.37%	19.37%	19.37%
	Risk-free rate	0.50%	0.50%	0.50%	0.50%
	Market risk premium	5.75%	5.75%	5.75%	5.75%
	Beta	3.28	3.28	3.28	3.28
	WACC	7.66%	7.66%	7.66%	7.66%
What are the most recent year revenues?	**Revenue**	100	100	100	100
	Costs	-86	-86	-86	-89
What is the EBITDA margin?	EBITDA margin	*13.76%*	*13.76%*	*13.76%*	11.00%
	EBITDA excl synergies	13.76	13.76	13.76	11
	Revenue synergies	0	0	0	0
	Cost synergies	-5	-5	-5	-5
	EBITDA after synergies	8.76	8.76	8.76	6
	EBITDA margin after synergies	8.76%	8.76%	8.76%	6.00%
What is the most recent year depreciation	**Depreciation**	-1	-1	-1	-1
	Operating income or EBIT	7.76	7.76	7.76	5
	Interest expensens and income	-7.5	-7.5	-7.5	-7.5
	EBT	0.26	0.26	0.26	-2.5
	Tax	-0.07	-0.07	-0.07	0
	Net result	0.20	0.20	0.20	-2.5
Are the capital expenditures the same as the depreciation?		Yes	Yes	Yes	Yes
If not, what are the capital expenditures?	**Capital expenditures**	-1	-1	-1	-1
What is the working capital as percentage of the revenue?	**Changes in working capital**	12.5%	12.5%	12.5%	12.5%
	FCFF	18.32	18.32	18.32	16.25
What are the losses from previous years that may be carried forward?	Net Operating Losses	0	0	0	0

FIGURE 2: THE CURRENT SITUATION QUESTIONS.

Figure 2 shows the questions asked for the first part which is the current situation. This describes the companies most recent year and is used as a starting point for the valuation. The first questions are mainly used to determine the WACC. The questions that follow are for the starting point. These questions ask the current revenue and the EBITDA margin, but also about the depreciation, the capital expenditures and working capital. The questions are often formulated to obtain an answer in the form of a percentage of the revenue, since this can take into account the potential growth of the company. The yes or no questions are focused on obtaining information about consistency between variables and years. The expected revenue and cost synergies are a more separate part of the tool, however these are shown to make the example free cash flow of the current year complete.

Another important question is the last question of current situation about the net operating losses. This is asked in order to determine the tax benefit, which should be taken into account for the following years.

Furthermore, for this part the net result and free cash flow of the current year are given to provide insight into the values that are filled in. This helps with determining if the answers are feasible and correct for the firm.

Upcoming five years questions

Upcoming years (1 - 5)					
Growth rate of Economy?	GDP growth rate	2%	3%	-1%	1%
Growth rate of Revenue?	Growth rate	2%	3%	-1%	1%
Will the EBITDA margin be the same as recent year?		Yes	Yes	Yes	Yes
If not, what will be the EBITDA margin?	EBITDA margin	62.50%	62.50%	62.50%	62.50%
Will the growth rate of the depreciation be the same as revenues?		Yes	Yes	Yes	Yes
If not, wat will be the growth rate of depreciation?	growth rate depreciation	2%	3%	-1%	1%
	Interest expenses	-7.5	-7.5	-7.5	-7.5
Will the capital expenditures be the same as the depreciation?		Yes	Yes	Yes	Yes
If not, wat will be the capital expenditures?	Capital expenditures	-100	-100	-100	-100
Will the working capital be the same percentage of the revenue as recent year?		Yes	Yes	Yes	Yes
If not, what will be the working capital as percentage of the revenue?	changes in working capital	15.00%	12.50%	12.50%	12.50%
	Revenue synergy year 1	0	0	0	0
	Revenue synergy year 2	0	0	0	0
	Revenue synergy year 3	0	0	0	0
	Revenue synergy year 4	0	0	0	0
	Revenue synergy year 5	0	0	0	0
	Cost synergy year 1	-5	-5	-5	-5
	Cost synergy year 2	-5	-5	-5	-5
	Cost synergy year 3	-5	-5	-5	-5
	Cost synergy year 4	-5	-5	-5	-5
	Cost synergy year 5	-5	-5	-5	-5

FIGURE 3: UPCOMING FIVE YEARS QUESTIONS.

The second part, shown in Figure 3, is the upcoming five years for the company in which the company probably goes through some large changes caused by the acquisition. The potential changes could lead to a lot of different values for the input compared to the current situation, therefore these questions are focused on the development of the current situation values. First of all, the companies revenue will probably grow over the upcoming years, therefore the growth rate is asked. The EBITDA margin could change but is expected not to, since the synergies are taken into account separately. Since there is a change of control, the way how depreciation and capital expenditures are treated can be different, therefore some questions ask about consistency between the current situation and the upcoming five years. Also, for each upcoming year the expected synergies are asked. This is done separately for each year since it could be that synergies need time to develop and even could be negative at the beginning. This is shown in Figure 4.

What are the expected revenue and cost synergies?

Synergies							
Year	Basis	1	2	3	4	5	6 - perpetuity
Revenue							
Reason 1	0	0	0	0	0	0	0
Reason 2	0	0	0	0	0	0	0
Reason 3	0	0	0	0	0	0	0
Reason 4	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Cost							
Reason 1	0	0	0	0	0	0	0
Reason 2	0	0	0	0	0	0	0
Loan expenses	-5	-5	-5	-5	-5	-5	-5
Reason 4	0	0	0	0	0	0	0
Total	-5	-5	-5	-5	-5	-5	-5

FIGURE 4: INPUT FOR THE EXPECTED SYNERGIES.

Stable period questions

Stable period (6 - perpetuity)					
Growth rate of Economy?	GDP growth rate	1%	2%	1%	1%
Growth rate of revenues?	Growth rate	1%	2%	1%	1%
Will be the EBITDA margin be the same as in year 5?		Yes	Yes	Yes	Yes
if not, what will be the EBITDA margin?	EBITDA margin	0.00%	0.00%	0.00%	0.00%
	Revenue synergies	0	0	0	0
	Cost synergies	-5	-5	-5	-5
Will the growth rate of the depreciation be the same as revenues?		Yes	Yes	Yes	Yes
If not, wat will be the growth rate of depreciation	growth rate depreciation	1%	2%	1%	1%
	Interest expenses				
Will the capital expenditures be the same as the depreciation?		Yes	Yes	Yes	Yes
If not, wat will be the capital expenditures	capital expenditures	-100	-100	-100	-100
Will the working capital be the same percentage of the revenue as last 5 years?		Yes	Yes	Yes	Yes
If not, what will be the working capital as percentage of the revenue?	changes in working capital	20.00%	12.50%	12.50%	12.50%
Acquisiton price					
Bookvalue		50			
What is the amount of goodwill to be paid?		20			
Acquisiton price		70			
What are the average multiples of **industry**					
EV/EBITDA		4			
EV/EBIT		3			
EV/Sales		2			
What are the average acquisition price multiples of **industry**					
Multiple Acquisition price/EBITDA		4			
Multiple Acquisition price/EBIT		3			
Multiple Acquisition price/Revenue		2			

FIGURE 5: STABLE PERIOD QUESTIONS.

After that, a more stable period is reached, which is the last part of the input shown in Figure 5. This is the period in which the company operates under normal conditions after the acquisition and therefore this information is also used as input for the terminal value. The period that is considered is from the start of year six into perpetuity. It is assumed that from the start of the stable year the values will be constant. Even for the synergies, since it is assumed that these should be realised at that time and be consistent for the upcoming years. The answers to these questions are of importance since these directly affect the terminal value, which often has a large impact on the total value of the firm as explained before. The questions are focussed again on the changes between the last five years and the stable period. Also, two questions are asked about the expected constant revenue and cost synergies for the future.

Additionally, a small input part is dedicated to the acquisition price and the multiples, which is used for the comparison between the different scenarios.

5.3. Data for input

The data used as input for the tool are obtained in two ways as explained. Many data are obtained from the user of the valuation tool with the questions and answer section, but some of the data are already incorporated in the tool. In this section, we discuss how these data are obtained, which assumptions are made and what the values are.

The data that are already incorporated in the tool do not have to be filled in by the user, since these data are obtained from public sources. The data that already have been obtained are the values of the risk-free rate, the market risk premium, the unlevered beta and tax rate. Also, the growth in gross domestic product (GDP) compared to last year is also incorporated in the tool, which will be explained in the next section. The data about the GDP was obtained from a data source of the Centraal Bureau voor de Statistiek (2021).

The risk-free rate is based on a Dutch government bond with a lifetime of 30 years, since this is the longest time that can be obtained on this bond. The risk-free rate according to this bond is 0.5% (MarketWatch, 2021).

The market risk premium is obtained from a recently published report, which shows the current premium that could be used. Therefore, the market risk premium used is 5.75% (KPMG, 2020).

The unlevered beta was obtained from Damodaran (2021). This dataset was well explained and incorporates a lot of companies. Besides, it showed the levered beta, the unlevered beta and the financial leverage used. This was not seen in other data sources. Therefore this data was seen as the most appropriate. The unlevered beta can be used to determine the levered beta, which will be done when determining the WACC in the next section. The unlevered beta has a value of 0.59. The industry of this unlevered beta is the auto and truck industry, which is considered to be the most representative industry compared to the company vehicles industry and is therefore selected.

The tax rate is the standard tax rate of the Netherlands, where the assumption is made that the company has no special tax arrangements with the Dutch tax authorities. The tax rate used is 25% (Government of the Netherlands, n.d.).

It is important to note, that the main assumptions of the tool are made on this input data. So, this input data plays a major role in the valuation as also mentioned in Chapter 4, for example when determining the WACC. Therefore the input data was carefully selected from reliable sources.

5.4. Calculation of different scenarios

Since now all data are available, the valuation can be done for the different scenarios. The firm value is estimated using the three different methods as mentioned in Chapter 3. For each scenario, a different sheet is used to do the valuation. The results of the valuations are combined in the output sheet to compare them. Figure 6 shows the calculation of the basis scenario, used as an example to illustrate the different calculations performed on the sheet. The values used are for explanatory purposes.

So, for each scenario the same calculations are done but with different inputs. The three main methods are performed. First, a discounted cash flow analysis is done, which partly serves as input for the economic value added method. Also, for determining the several multiples information is used from the discounted cash flow analysis. The discounted cash flow analysis is the basis for the calculation of the other methods. The three calculations performed by the tool will be discussed below.

The discounted cash flow analysis calculation

Company valuation of:	Company Y	Basis scenario										
DCF												
WACC	7.66%											
*Values * 1000 €*	*Base year*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	
Year	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**Terminal year**
Economy growth rate	0%	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Revenue growth rate	0%	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Revenue	100.00	102.00	104.04	106.12	108.24	110.41	111.51	112.63	113.75	114.89	116.04	117.20
Costs	-86.24	-88.80	-90.57	-92.38	-94.23	-96.12	-96.62	-97.59	-98.56	-99.55	-100.55	-101.55
EBITDA margin	*13.76%*	*12.94%*	*12.94%*	*12.94%*	*12.94%*	*12.94%*	*13.35%*	*13.35%*	*13.35%*	*13.35%*	*13.35%*	*13.35%*
EBITDA	13.76	13.20	13.47	13.74	14.01	14.29	14.89	15.04	15.19	15.34	15.49	15.65
Revenue synergies	0	0	0	0	0	0	0	0	0	0	0	0
Cost synergies	-5.00	-5.10	-5.10	-5.10	-5.10	-5.10	-5.05	-5.10	-5.15	-5.20	-5.26	-5.31
EBITDA after synergies	8.76	8.10	8.37	8.64	8.91	9.19	9.84	9.94	10.04	10.14	10.24	10.34
EBITDA margin after synergies	*8.76%*	*7.94%*	*8.04%*	*8.14%*	*8.23%*	*8.32%*	*8.82%*	*8.82%*	*8.82%*	*8.82%*	*8.82%*	*8.82%*
Depreciation	-1	-1.02	-1.04	-1.06	-1.08	-1.10	-1.12	-1.13	-1.14	-1.15	-1.16	-1.17
Operating income or EBIT	7.76	7.08	7.33	7.58	7.83	8.09	8.72	8.81	8.90	8.99	9.08	9.17
Interest expensens and income	-7.5	-7.65	-7.80	-7.96	-8.12	-8.28	-8.45	-8.62	-8.79	-8.96	-9.14	-9.23
EBT	0.26	-0.57	-0.48	-0.38	-0.29	-0.19	0.28	0.20	0.11	0.03	-0.06	-0.06
Tax	-0.07	0.00	0.00	0.00	0.00	0.00	-0.07	-0.05	-0.03	-0.01	0.00	0.00
Net result	0.20	-0.57	-0.48	-0.38	-0.29	-0.19	0.21	0.15	0.08	0.02	-0.06	-0.06
EBIT(1-t)	5.82	5.31	5.50	5.68	5.87	6.07	6.54	6.61	6.68	6.74	6.81	6.88
Capital expenditures	-1	-1.02	-1.04	-1.06	-1.08	-1.10	-1.12	-1.13	-1.14	-1.15	-1.16	-1.17
Change in working capital	-12.5	-0.25	-0.26	-0.26	-0.27	-0.27	-0.14	-0.14	-0.14	-0.14	-0.14	-0.15
FCFF	-6.68	5.06	5.24	5.42	5.61	5.79	6.41	6.47	6.53	6.60	6.67	6.73
Net Operating Losses	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV(FCFF)	39.93	45%										
PV(Terminal value)	48.37	55%										
NPV Firm value	**88.30**	100%										

FIGURE 6: THE DISCOUNTED CASH FLOW ANALYSIS CALCULATION OF THE BASIS SCENARIO.

Figure 6 shows the first part of the calculation, which is the discounted cash flow analysis. The calculations of the analysis are the same for each year. The first two rows show the economy growth rate and revenue growth rate for each year. After that, the revenue is given, which is calculated by multiplying the revenue of the previous year with the revenue growth rate, as shown in Equation 13. This way of incorporating the revenue growth rate is logical and used in several valuation models and therefore is assumed to be appropriate.

$$Revenue_n = Revenue_{n-1} * (1 + revenue\ growth\ rate_n) \quad (13)$$

The costs are determined using the EBITDA margin. The EBITDA margin is based on the input of the user and the state of the economy.

This calculation is as follows:

$$EBITDA_n = Revenue_n * EBITDA\ margin_n \quad \textbf{(14)}$$

The EBITDA margin is more complex to determine. The EBITDA margin changes over time caused by the state of the economy and the growth of revenue as explained in Section 4.2. To incorporate this effect, we performed a linear regression to model the relationship between the two variables and the EBITDA margin. To do this, we used Excel data analysis. The linear regression used the EBITDA margin of year n with the corresponding revenue growth rate and economy growth rate of that same year n. The revenue growth rate was determined using the following equation:

$$Revenue\ growth\ rate_n = \frac{Revenue_n - Revenue_{n-1}}{Revenue_{n-1}} \quad \textbf{(15)}$$

The economy growth rate for year n was based on the gross domestic product growth of that same year n. We determined the economy growth rate similarly to the revenue growth rate, thus by comparing the previous year with the current year n.

So, the data used consist of the results of company X of the previous years and the gross domestic product of the Netherlands. We selected a period of ten years and therefore the model uses a limited amount of data. This is done because a longer period would not be representative for the performance of the company. Next to that, some of the data used can give a biased view caused by different reasons. For example one year, the revenue growth is much higher as a result of a merger and acquisition. In the last year, the revenue decreased a lot caused by COVID, which had a large impact on the sector. These events create a lot of disturbance in the data, resulting in a higher error of the model. The linear regression resulted in the following equation for determining the EBITDA margin for each year:

$$EBITDA\ margin_n = \alpha + \beta_1 * Economy\ growth\ rate_n + \beta_2 * Revenue\ growth\ rate_n \quad \textbf{(16)}$$

The α is the constant, which represents the EBITDA margin without any effects of the economy or revenue growth rate. This value can be seen as the standard EBITDA margin and has a value between -5% and 25%. In this calculation the value that is used is 10%. The β_1 is the coefficient for the economy growth rate, which has a value between -10% and -50%. The coefficient is negative and therefore the EBITDA margin decreases when the economy growth rate is positive. The value that is used in the calculation is -40%. The coefficient of the revenue growth rate is β_2, which has a value between -1% and -10%. This coefficient is negative, resulting in negative effect on the EBITDA margin. The value used in the calculation is -5%. This results in the following equation:

$$EBITDA\ margin_n = 0.10 - 0.40\ * Economy\ growth\ rate_n - 0.05 * Revenue\ growth\ rate_n \quad \textbf{(17)}$$

It was expected that the revenue and the economy would have positive coefficients and that they would increase the EBITDA margin. However, due to the interaction between the revenue of trucks and the revenue on maintenance the opposite occurs. Therefore the coefficients are negative.

Despite the limited amount of data, the linear regression gave a reasonable result. The descriptive statistics show that the standard error is low with a value of 0.7%, this means that on average the EBITDA margin values predicted by the model deviate 0.7% from the data values. In addition, the p-value of the model is 0.008 making it statistically significant.

After establishing the EBITDA, the revenue and cost synergies are included. These are not included from the start because it is important to make the distinction between the firm value with or without

synergies, since it is not certain that these can be realised. Also, by separating the synergies from the EBITDA, the effect of the synergies on the EBITDA margin can be shown. This difference can then also be used for determining the multiples with and without synergies, which is also used for the comparison. The new EBITDA margin is calculated by dividing the EBITDA including synergies by the sum of the revenue and revenue synergies. The reason for this is that revenue synergies increase the revenue and therefore should be accounted for in the EBITDA margin. This calculation is shown in the equation below.

$$EBITDA\ margin\ incl\ synergies = \frac{(EBITDA + revenue\ synergies + cost\ synergies)}{(revenue + revenue\ synergies)} * 100\% \quad \textbf{(18)}$$

After that, the depreciation is subtracted to determine the EBIT. The depreciation is based on the input value of the user. This could mean that it follows the same growth as the growth rate of the revenue or a chosen growth rate. Besides, the depreciation is based on the deprecation of last year.

The equation for the depreciation is:

$$Depreciation_n = Depreciation_{n-1} * (1 + revenue\ growth\ rate_n) \quad \textbf{(19)}$$

In the case that a different growth rate is given as input value, the revenue growth rate of the current year is replaced in the equation with that growth rate. This way of determining the depreciation was seen in several models and is intuitively logical. Based on the input values from Figure 1, the revenue growth rate is followed.

Then the taxes and interest expenses are subtracted to determine the net result. The taxes are determined by multiplying the EBIT with the tax rate. Before that, the potential net operating losses are subtracted from the EBIT used in the tax calculation. The interest expenses are based on the cost of debt and the amount of debt, which are retrieved from the input. The interest expenses are determined by multiplying the cost of debt with the amount of debt.

The EBIT is also the starting point for determining the free cash flow to the firm. This calculation follows equation 12.

$$FCFF = EBIT(1 - tax\ rate) + Depreciation - Capital\ expenditure - \Delta Working\ capital \quad \textbf{(12)}$$

Using the values from Figure 6, the free cash flow to the firm is determined. The EBIT is multiplied with one minus the tax rate, to subtract the taxes. Then the depreciation is added and the capital expenditures and changes in working capital are subtracted. The capital expenditures are determined based on the input values. Depending on the answer, the capital expenditures can equal the depreciation value or have a different value. Sometimes the capital expenditures are assumed to be equal to the depreciation in valuation (personal communication, 30 April 2021). Therefore this possibility is taken into account. The use of an input value is a standard option and is used in several valuation models.

In this example, the capital expenditures are equal to the depreciation. The change in working capital is determined by multiplying the change in revenue with the working capital as a percentage of the revenue. This way of determining the working capital was seen in several models and is standard.

Depending on the answer, the percentage can be the same as previous years or a different percentage can be used. The calculation is done using the following equation:

$$Change\ in\ working\ capital_n = (Revenue_n - Revenue_{n-1}) * working\ capital\ as\ percentage\ of\ revenue_n \quad \textbf{(20)}$$

The values of the depreciation, capital expenditures and change in working capital can be used in Equation 12 to determine the free cash flow to the firm for each year.

As explained, the growth rate is taken into account over the years by multiplying the revenue with this rate. Also, the interest expenses and income will follow the growth rate. Furthermore, depending on the

answers to the input questions, the depreciation can grow at the revenue growth rate. The capital expenditures and changes in working capital can indirectly follow the growth rate, since these values depend on the revenue and depreciation.

The value of the free cash flow to the firm for the terminal year is determined using Equation 21, which is the last part of Equation 2.

$$Terminal\ year\ value\ = \frac{FCFF_{n+1}}{(WACC - g)} \tag{21}$$

Where

n = Life of the firm.
$FCFF_t$ = Free cash flow to firm in year t.
WACC = Weighted average cost of capital.
g = Growth rate.

In this equation, the free cash flow to the firm is determined in the same way as described above.

Finally, the firm value is determined by adding the present value of the free cash flows to the firm and the present value of the terminal value. This is done by discounting the values at the WACC. The WACC is calculated using Equation 3 and the cost of equity using Equation 4:

$$\text{WACC} = r_d(1 - T_c)\frac{D}{(D+E)} + r_e\frac{E}{(D+E)} \tag{3}$$

$$r_e = r_f + \beta(r_m - r_f) \tag{4}$$

Using the input values, we determined the cost of equity in the following way:

$$r_e = 0.1248 = 0.005 + 1.92\ * 0.0625$$

We determined the beta using Equation 5:

$$\beta_{private\ firm} = \beta_{unlevered}(1 + (1 - tax\ rate)(\frac{industry\ average\ debt}{industry\ average\ equity})) \tag{5}$$

Using the input values, we determined the beta for the firm.

$$1.92 = 0.59 * (1 + (1 - 0.25) * (\frac{150}{50}))$$

The beta is rather high, which is caused by the high financial leverage of the firm. The debt-to-equity ratio is 300%. The average in the industry is 180% according to the dataset of Damodaran (2021). Multiplying the debt-to-equity ratio of the firm with the unlevered beta of 0.59 results in a beta of 1.92. The difference in financial leverage causes the large difference between the average beta of the industry with a value of 1.43 and the beta of the firm of 1.92.

A reason for this difference in financial leverage can be the moment of measurement. During the year the working capital fluctuates resulting in a different debt value of the firm. Since the moment of measurement is unknown, the beta could be lower or higher but this is difficult to check.

We used these values to determine the WACC, which results in a WACC of 5.93%:

We used Equation 2 for determining the firm value:

$$\text{Value of the firm} = \sum_{t=1}^{n} \frac{FCFF_t}{(1+WACC)^t} + \frac{FCFF_{n+1} / (WACC - g)}{(1+WACC)^n} \quad (2)$$

The economic value added calculation

EVA												
	Base year	1	2	3	4	5	6	7	8	9	10	
*Values * 1000€*	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**Terminal year**
EBIT(1-t)	5.82	5.31	5.50	5.68	5.87	6.07	6.54	6.61	6.68	6.74	6.81	6.88
Capital invested * WACC	15.31	15.31	15.33	15.35	15.37	15.39	15.41	15.42	15.43	15.44	15.45	1.11
EVA	-9.49	-10.00	-9.84	-9.67	-9.50	-9.33	-8.87	-8.81	-8.76	-8.70	-8.65	5.77
PV(EVA)	-63.47	-72%										
PV(Terminal value)	41.43	47%										
NPV	-22.04											
Capital invested	200	227%										
PV of change in capital invested at the er	-89.66	-102%										
Firm value	**88.30**	100%										
ROC		2.66%	2.74%	2.83%	2.92%	3.02%	3.25%	3.28%	3.31%	3.34%	3.37%	47.41%
Imputed capital												14.51
Capital invested												
Initial	200	200	200.25	200.51	200.77	201.03	201.30	201.44	201.58	201.72	201.86	202.01
Depreciation	-1.00	-1.02	-1.04	-1.06	-1.08	-1.10	-1.12	-1.13	-1.14	-1.15	-1.16	-1.17
Capital expenditures	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.13	1.14	1.15	1.16	1.17
Changes in working capital	12.50	0.25	0.26	0.26	0.27	0.27	0.14	0.14	0.14	0.14	0.14	0.15
End capital	212.50	200.25	200.51	200.77	201.03	201.30	201.44	201.58	201.72	201.86	202.01	202.15

FIGURE 7: THE ECONOMIC VALUE ADDED CALCULATION OF THE BASIS SCENARIO.

Next, we applied the economic value added method to determine the value of the firm, which is shown in Figure 7. This starts on the first row with the values of the operating income after tax of the discounted cash flow analysis. Then the required return is subtracted to determine the value of EVA for that year. The EVA for each year is determined using Equation 7.

$$\text{Economic value added}_n = \text{After-tax operating income}_n - (\text{Cost of capital} * \text{Capital invested}_n) \quad (7)$$

We establish the invested capital for each year by taking the end capital of last year. We determine the end capital of the last year by subtracting the depreciation and adding the capital expenditures and changes in working capital to the invested capital at the start of the year. This is multiplied by the WACC to determine the required return of that year.

For the required return in the terminal year, the imputed capital is used. The imputed capital is established by dividing the operating income after tax with the return on capital of the terminal year. The return on capital is determined by dividing the growth rate with the result of dividing the sum of the depreciation, the capital expenditures and the change in working capital with the operating income after tax. Equation 22 shows this calculation (Damodaran, 2012):

$$Imputed\ capital = \frac{\frac{EBIT(1-t)}{g}}{\left(\frac{Depreciation - capital\ expenditures - changes\ in\ working\ capital}{EBIT(1-t)}\right)} \quad (22)$$

For determining the terminal value, the same method is used as with the discounted cash flow analysis, only now the EVA is used instead of the free cash flow to the firm.

As explained in Chapter 3, the change in capital invested at the end of year ten has to be established. The change in capital invested is determined by subtracting the invested capital at the start of the terminal year from the imputed capital.

The firm value is determined by adding the present value of the EVA of each year, the present value of the terminal value, the invested capital and the present value of the change in capital invested. To

determine the present values, the same WACC and growth rate as for the discounted cash flow analysis are used for discounting the values. Equation 8 is used for this calculation.

$$\text{Firm value} = \text{Capital invested}_0 + \sum_{t=1}^{n} \frac{EVA_t}{(1+WACC)^t} + \frac{EVA_{n+1} / (WACC - g)}{(1+WACC)^n} + \frac{Change\ of\ capital\ invested}{(1+WACC)^n} \quad \textbf{(8)}$$

The multiples calculation

Multiple		Incl synergies	
EV/EBITDA	6.10	9.45	
EV/EBIT	6.61	10.72	
EV/Sales	0.80	0.80	
Multiple of acquisition price			
Acquisition price/EBITDA	4.84		
Acquisition price/EBIT	8.49		
Acquisition price/Sales	0.64		
Firm value above acquisition price	18.30		

FIGURE 8: THE MULTIPLES CALCULATION OF THE BASIS SCENARIO

Finally, the multiples are determined, as shown in figure 8. This is done by dividing the two variables that are part of the ratio with each other. The input is obtained from the discounted cash flow analysis, where the values used are averages of the ten year period. An average is taken, since some years can fluctuate caused by for example economic conditions, making an average more representative. The multiples that are calculated are the EV-to-EBITDA ratio, EV-to-EBIT ratio and EV-to-Sales ratio. These are again determined but including the synergies, to give insight into the future performance of the firm.

Also, multiples are determined for the acquisition price. This is done by dividing the acquisition price by the EBITDA, EBIT or Sales. Furthermore, the acquisition price above firm value is determined by subtracting the estimated value of the firm from the acquisition price. The acquisition price is based on the principle of an assets liabilities transaction in which the book value of the company is determined and an amount for goodwill is added.

In the figure the EV-to-EBITDA ratio is calculated as an example using the following equation:

$$\text{EV-to-EBITDA ratio} = \frac{\text{Equity value}}{\frac{1}{n} * \sum_{t=1}^{n} EBITDA_t} \quad \textbf{(23)}$$

Where

n = Life of the firm.
$EBITDA_t$ = EBITDA in year t.

The sensitivity analysis

Firm value for WACC (x-axis) and growth rate (y-axis)							
88.30	4.66%	5.66%	6.66%	**7.66%**	8.66%	9.66%	10.66%
-1%	131.31	103.38	85.32	72.68	63.33	56.14	50.44
0%	141.53	111.10	91.44	77.69	67.53	59.72	53.53
1%	152.15	119.13	97.80	82.89	71.89	63.43	56.74
2%	163.18	127.47	104.41	88.30	76.41	67.29	60.07
3%	174.65	136.13	111.27	93.91	81.11	71.29	63.53
4%	186.57	145.13	118.40	99.74	85.99	75.45	67.11
5%	198.94	154.47	125.79	105.78	91.05	79.75	70.83
Firm value for WACC (x-axis) and EBITDA (y-axis)							
88.30	4.66%	5.66%	6.66%	**7.66%**	8.66%	9.66%	10.66%
11.8%	119.80	93.43	76.41	64.52	55.76	49.04	43.72
12.3%	130.64	101.94	83.41	70.47	60.92	53.60	47.80
12.8%	141.49	110.45	90.41	76.41	66.09	58.16	51.89
13.3%	152.34	118.96	97.41	82.35	71.25	62.73	55.98
13.8%	163.18	127.47	104.41	88.30	76.41	67.29	60.07
14.3%	174.03	135.98	111.41	94.24	81.58	71.86	64.16
14.8%	184.88	144.49	118.41	100.19	86.74	76.42	68.25
15.3%	195.73	153.00	125.41	106.13	91.91	80.98	72.34
15.8%	206.57	161.51	132.41	112.07	97.07	85.55	76.42

FIGURE 9: THE SENSITIVITY ANALYSIS OF THE FIRM VALUE.

As explained in Section 5.2, a sensitivity analysis is done to assess the influence of changes in variables on the value of the firm. This is done in the following way.

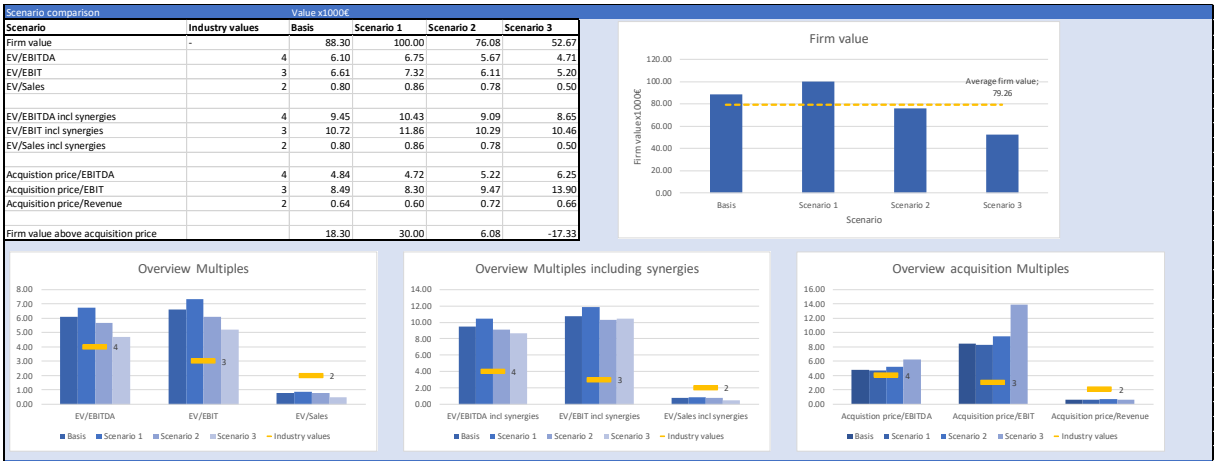
Two tables are created with on the first row and first column of the tables different values of variables. The variables increase or decrease with a value depending on the variable to investigate. The first table compares the WACC with the growth rate. The second table shows the relationship between the WACC and the EBITDA margin. This is shown in Figure 9.

For the WACC and the growth rate, one percent is added or subtracted from the basis scenario value. This is assumed to be feasible and indicates a significant difference in value. For the EBITDA margin, the assumption is made that the values will fluctuate less and therefore steps of a half percent are made. Besides the value of the EBITDA that is changed is the input value, which will affect all years of the valuation.

Within the table, the value of the firm is calculated for each combination of variables using the basis scenario. The table is coloured from red to green, indicating the increase or decrease in firm value when increasing or decreasing the value of variables. The result of this is shown on the calculation and output sheet.

5.5. Output of the valuation

The output of the valuation consists of two parts. The first part is the scenario analysis and the second part is the sensitivity analysis.



Scenario comparison		Value x1000€			
Scenario	Industry values	Basis	Scenario 1	Scenario 2	Scenario 3
Firm value	-	88.30	100.00	76.08	52.67
EV/EBITDA	4	6.10	6.75	5.67	4.71
EV/EBIT	3	6.61	7.32	6.11	5.20
EV/Sales	2	0.80	0.86	0.78	0.50
EV/EBITDA incl synergies	4	9.45	10.43	9.09	8.65
EV/EBIT incl synergies	3	10.72	11.86	10.29	10.46
EV/Sales incl synergies	2	0.80	0.86	0.78	0.50
Acquistion price/EBITDA	4	4.84	4.72	5.22	6.25
Acquisition price/EBIT	3	8.49	8.30	9.47	13.90
Acquisition price/Revenue	2	0.64	0.60	0.72	0.66
Firm value above acquisition price		18.30	30.00	6.08	-17.33

FIGURE 10: THE SCENARIO ANALYSIS.

The output of the valuation is the firm value and several multiples, which are determined for every scenario in the calculation part. These data are summarized in the output sheet in order to compare the results. The output sheet represents the different values of the scenarios in a table, to give a numerical overview. Besides, the data are converted into graphs to compare the results with each other, providing an overview and an indication of the size of deviations between scenarios. The first part of the output sheet is shown in Figure 10. The values in the scenario analysis are from the example calculation of Section 5.4.

The table shows on the first row the firm value for the different scenarios. The following rows show the different values of the multiples. In the last row of the table, the firm value above the acquisition price is given.

The first chart is the firm value. This table gives the values of the firm for different scenarios and shows the average firm value of the scenarios.

The second chart, the Overview acquisition multiples, shows three multiples which are the EV/EBITDA, EV/EBIT and EV/Sales. In the chart, these values are compared with industry averages, which is indicated by the yellow line.

The third and fourth charts, which are the Overview multiples including synergies chart and the Overview acquisition multiples chart do the same as the second chart only for the different multiples.

FIGURE 11: THE SENSITIVITY ANALYSIS.

The second part of the output is the sensitivity analysis, which is shown in Figure 11.

The first chart shows several variables and the value of the free cash flow to the firm and EVA of each year. This is to show the result on the free cash flows and EVA of certain changes in variables, such as the growth of economy, growth of revenue or change in EBITDA margin. The variables that are shown in the table are the economy growth rate, the revenue growth rate, the EBITDA margin and the EBITDA margin after adding the synergies.

The two tables to the right of the charts serve as an input for the charts. As explained before, the tables show the firm value taken into account different combinations of variable values. The first table gives the result of the combination of different values for the WACC and the growth rate. The second table does this for the WACC and the EBITDA margin.

The second chart shows for different WACC values the firm value. These bars consist of multiples pieces, each representing the firm value for a certain growth rate. The yellow bar indicates the basis scenario without any changes to the variable values. The chart shows what would happen with the value of the firm when the growth rate would decrease or increase, for each discount rate. The ranges of firm value give the possibility to consider the uncertainty of the values of the variables, since these variables are often difficult to estimate.

The third chart shows for different EBITDA margins the firm value. There are several lines in the chart, which represent different WACC values.

6. Data analysis

In this chapter, the companies that will be analysed are discussed. These are fictitious companies that potentially could be taken over by company X in the future. Their input values are therefore assumptions but are considered to be realistic for a company in this sector. The companies that are going to be valued are Company A and Company B. These are quite different from each other, which is done to show the possibilities of the valuation tool.

The companies are operating in the same industry and therefore the unlevered beta is the same. Additionally, we assume that they operate in the Netherlands and therefore have the same tax conditions. However, there are some differences between the two companies.

The main differences are the debt-to-equity ratio, the revenue, the EBITDA margin and the expected synergies. Some of the inputs are consistent for both since this would make sense when comparing them. For example, the behaviour of the economy is assumed to be the same for both. In addition, the cost of debt is the same, because the assumption is made that they can borrow at a similar rate. The input data that is already incorporated in the tool is kept consistent between the two companies.

For both companies the base scenario is calculated. Furthermore, a scenario is calculated in which the economy grows and a scenario where the economy declines. A fourth scenario is made in which the EBITDA margin is decreased. Below the characteristics and the input values of the companies are described.

Company A

Company A performed better than Company B. The input values of Company A are shown in Appendix B. The current debt-to-equity ratio is calculated with the debt and equity values of the company, which are respectively 15 million euros and 5 million euros. The revenue of the last year is estimated to be 100 million euros. The EBITDA margin of last year is estimated to be 15%.

We expect that when the company is acquired that a lot of synergies can be captured, with rather low investments at the beginning. We expect the revenue synergies to be 0.2 million euros. The cost synergies are expected to cost around 1 million euros for the first two years. After that, they will earn the following three years around 0.5 million euros. After year five, we assume these will become 0.250 million euros and we assume these to be consistent for the future. The combination of revenue and cost synergies are also shown in Appendix B. The amount of goodwill to be paid is estimated at 20 million euros.

Company B

Company B is a smaller company than Company A. The input values of Company B are shown in Appendix B. Company B has an equity of 2 million euro and a debt of 8 million euro. Their revenue of last year is estimated about 50 million euro. The EBITDA margin of the last year is estimated to be 5%. Since Company B was not doing so well in the past, we assume that they have a net operating loss of previous years, which will be around 1 million euros.

After the acquisition, we expect that not many synergies can be realised, however high investments are made for these synergies. We expect the synergies to cost 1 million euros for the first two years. After that we expect the company to realise synergies which will earn the company around 0.5 million euros for the next three years. In the following years, the synergies are assumed to be consistent with a positive value of 0.25 million euros. We provide the combination of the revenue and cost synergies in Appendix B. Since there is less potential for synergies and the company is doing worse than company A, the goodwill to be paid is estimated to be 8 million euros.

7. Application of the tool

In Section 7.1, the scenario analysis for both companies is discussed. In Section 7.2, the sensitivity analysis is discussed. The calculation of the basis scenario for Company A and Company B can be found in Appendix B.

Furthermore, in this chapter we discuss the validation and sensitivity analysis of the tool. We discuss the validation in Section 7.3. Since the tool itself has a sensitivity analysis, this part is covered when discussing the sensitivity analysis output. Also, the impact of input values on the firm value is quantified and shown.

7.1. Scenario analysis

FIGURE 12: THE SCENARIO ANALYSIS FOR COMPANY A.

The scenario analysis of Company A is shown in Figure 12. In this table it is shown that the firm value is in the range of 102 to 170 million euro. The multiple values are almost in each scenario lower than the industry average. When including the synergies these values are even lower, because of the increase in EBITDA, EBIT and Sales caused by synergies. The acquisition multiples are less than half of the industry values for the basis, first and second scenario. Only in scenario 3 the acquisition multiples are slightly higher. Besides, the estimated firm values are all above the acquisition price.

The chart Firm value shows that the average firm value is around 138 million euros. The other charts show the comparison of the multiples with each other and with the industry values.

FIGURE 13: THE SCENARIO ANALYSIS FOR COMPANY B.

The scenario analysis of Company B is shown in Figure 13. The table shows that the firm value ranges from around 4 to 17 million euros. The firm value does also show that the firm value in Scenario 1 is

lower than that of Scenario 2. This means that when the economy grows the firm value was lower than when the economy growth decreases. This is relationship will be discussed in the sensitivity analysis.

Most of the multiples have a lower value than the industry average, however the EBIT multiples with or without multiples in the third scenario are higher than the industry average. Since the EBITDA margin is rather low in this scenario but the depreciation costs are not changed, it results in a rather low EBIT. The sensitivity of the firm value to the EBITDA margin will be further discussed in the sensitivity analysis. The same reasoning applies to the acquisition price-to-EBIT ratio, which is also high compared to the other scenarios as shown in the chart Overview Multiples including synergies.

Scenario 3 indicates that when the firm would be bought and this scenario would occur, the firm would be less worth than the price paid.

7.2. Sensitivity analysis

149543.10	4.66%	5.66%	6.66%	7.66%	8.66%	9.66%	10.66%
-1%	242177.12	190215.93	156621.57	133116.28	115747.07	102387.62	91792.39
0%	252772.16	198263.57	163032.42	138390.05	120187.29	106192.30	95097.77
1%	263782.42	206623.13	169688.98	143863.71	124793.94	110138.00	98524.30
2%	275220.21	215303.76	176598.47	149543.10	129571.84	114228.80	102075.46
3%	287098.10	224314.88	183768.21	155434.14	134525.91	118468.82	105754.78
4%	299428.88	233666.03	191205.70	161542.89	139661.16	122862.29	109565.86
5%	312225.59	243366.95	198918.55	167875.51	144982.68	127413.50	113512.37

149543.10	4.66%	5.66%	6.66%	7.66%	8.66%	9.66%	10.66%
13.0%	231832.69	181262.65	148598.02	125767.56	108916.96	95973.07	85721.55
13.5%	242679.57	189772.93	155598.13	131711.44	114080.68	100537.00	89810.03
14.0%	253526.45	198283.21	162598.24	137655.33	119244.40	105100.93	93898.50
14.5%	264373.33	206793.48	169598.36	143599.21	124408.12	109664.87	97986.98
15.0%	275220.21	215303.76	176598.47	149543.10	129571.84	114228.80	102075.46
15.5%	286067.09	223814.04	183598.58	155486.99	134735.56	118792.73	106163.93
16.0%	296913.97	232324.32	190598.69	161430.87	139899.28	123356.66	110252.41
16.5%	307760.85	240834.59	197598.80	167374.76	145063.00	127920.60	114340.89
17.0%	318607.73	249344.87	204598.91	173318.64	150226.72	132484.53	118429.37

FIGURE 14: THE SENSITIVITY ANALYSIS FOR COMPANY A.

The sensitivity analysis of Company A is shown in Figure 14.

The first graph illustrates the value of the free cash flows to the firm and the EVA of each year. Also, it shows that when the economy and revenue have a positive growth rate then the EBITDA margin is lower. This results in a higher free cash flow to the firm and a higher EVA value. The opposite applies when the economy and revenue have a negative growth rate.

The second graph illustrates that the firm values are closer to each other when the WACC increases. This means that an increase or decrease in growth rate has a smaller effect on the firm value when the WACC is high.

The third graph illustrates that the firm value increases when the EBITDA margin increases and that there is a faster increase when the WACC is low. Also, the tables indicate that under all values of the variables in the table, the firm value will be positive. However, that an increase of the WACC, a decrease of the growth rate and a decrease of the EBITDA margin have a negative impact on the value of the firm.

FIGURE 15: THE SENSITIVITY ANALYSIS FOR COMPANY B.

The sensitivity analysis of Company B is shown in Figure 15.

In the graph, Margins, FFCF and EVA over time in basis scenario, the same effect on the free cash flows and EVA applies as described for Company A. It also shows that the synergies increase the EBITDA margin. The first years an investment is made in the synergies, which results in a lower EBITDA margin after synergies than the EBITDA without synergies, as shown in the graph. Besides the first two years, the free cash flows to the firm are positive, however the EVA values are negative meaning that the firm does not create value for itself.

The behaviour of the firm value is similar as with the other company as shown in the second graph. This is logical, since they use the same calculation methods.

In the third graph, the firm value increases when the EBITDA margin increases. Which is the same behaviour as Company A, however due to the scale of the chart the behaviour seems different.

In the table can be seen that all firm values are positive, however in some cases the firm value is close to zero.

The WACC used for the calculations depends on the debt-to-equity ratio, which is higher in the case of Company B. This results in a higher WACC for Company B than that of Company A. As explained in Section 4.4, the WACC is also influenced by the beta of the firm, the risk-free rate and the market risk premium. Besides, the beta itself is influenced by the debt-to-equity ratio. The table shows what would happen if the WACC would increase or decrease, which represents an increase or decrease in one of these values. In order to test the individual effects, the scenario analysis can be used.

7.3. Validation

The validity of the tool is difficult to determine, since valuation is also based on the view of the analyst on how to value a firm. For example, when deciding the risk-free rate to use or selecting an appropriate beta, the opinion of the analyst plays a role. So, the chosen input values make it difficult to validate if the estimation is valid because this depends on the perspective of the user.

A part which could be validated is the calculation part of the tool, however this part follows general calculation rules for the discounted cashflow and EVA methods. So, when filling in data of previous acquisitions and comparing the estimations of the firm value according to other sources, the values should be similar when using the same input values and assumptions. This is rather difficult to check, since there is no information available about acquisitions of companies operating in this sector.

In addition, the validity of the EBITDA margin could be considered. The behaviour of the EBITDA margin is based on the state of the economy and the revenue growth. However, the equation used to follow the EBITDA margin could be tested using more data if available. Furthermore, the equation is modelled with a limited amount of data.

8. Conclusion, discussion and recommendations

8.1. Conclusion

Our research focussed on answering the main research question:

How to determine the acquisition value of a private company in the company vehicles sector?

To answer this question, we developed a valuation support tool. For the development of this tool we had to answer several research questions. We discuss these questions and the answers to them below. The answers contribute to answering the main research question through the development of the tool.

First, we had to find an appropriate method to determine the value of a private company. We discussed several methods, before selecting the most appropriate method. We selected the discounted cash flow analysis based on the business characteristics and the characteristics of the analyst.

The specific discounted cash flow model we selected is the free cash flow to the firm model, because it values the entire firm and captures a changing debt-to-equity ratio. Another characteristic making it appropriate, is that the model gives insights into the specific cash flows, enabling to investigate which factors contribute to the value of the firm. This is not the case when valuing the firm using relative valuation, which is more of a “black box”.

Also, we had to decide the growth pattern and the use of current or normalized earnings for the tool. The growth pattern we used is a two-stage growth because this enables the tool to capture the potential unstable growth rate after an acquisition. Furthermore, we selected the current earnings.

In addition, we used another discounted cash flow method and a relative valuation method. We selected the economic value added and relative valuation method for additional insights. The economic value added method shows whether the firm creates value for itself or not, which is when the excess cash flow is more than zero. The relative valuation uses multiples, which are of interest because they enable the comparison of the value of the company relative to the performance and value of the other companies in the sector. We selected the multiples based on that they are commonly used in the sector, which are the EV/EBITDA, EV/EBIT and EV/Sales.

Second, we had to answer the question on what the selected methods in particular for this sector mean. Therefore, we explained the different methods in detail. We discuss the free cash flow to the firm method and how to apply it. Also, the calculation of the discount rate which is the weighted average cost of capital and in particular the cost of equity which is determined using the capital asset pricing model is explained. This is done by looking at how to incorporate the sector-specific risk into the valuation, by using a levered beta of the sector. We explained the economic value added method and the relation with the free cash flow to the firm model. We had to understand the use of the free cash flow to the firm model and the economic value added method to be able to incorporate it in the tool.

Furthermore, we found several reasons for making an acquisition, which could influence the valuation. One of the reasons was the potential for synergies. However, we had to understand the concept of valuing these synergies to be able to process it in the valuation methods used and eventually in the valuation tool. There were many types of synergies found, but we made the distinction between revenue and cost synergies, since these have different chances of success. These two types were incorporated into the tool. The value of control can be determined by comparing the value of the firm with and without management changes. Next to that, we investigated the determination of goodwill to understand the impact on the valuation, which only was important for the acquisition price rather than the value of the company. Also, the determination of the multiples had to be similar to the calculation method applied by the industry, meaning the method of calculation had to be known.

Third, to answer the question of which factors impact the acquisition value of a private company operating in a specific sector, we investigated several aspects of the valuation.

Before investigating the factors that influence the valuation, the uncertainty in valuation had to be investigated. The information used as input data has uncertainty in the values. And since valuation is involved with assumptions about the future it is inherently uncertain. We found two methods to take this uncertainty into account by testing the effect on changes, which were the sensitivity analysis and scenario analysis. Sensitivity analysis can consider the effect of changes to one variable. However, scenario analysis is also of importance, since variables can be interrelated. In the scenario analysis several variables are changed at the same moment. Different scenarios can provide a range of values, providing an indication of the value and riskiness of a company.

We investigated the sector characteristics with impact on the valuation, which resulted in several factors. It was found that firms operating in the sector are cyclical. This means that the state of the economy plays a major role in the revenue growth and the EBITDA margin. A sector-specific relationship between the state of the economy, the revenue growth and the EBITDA margin was established. Meaning that when the revenue or economy grows the EBITDA margin will decrease. This is caused by the shift in revenue, from the sales in new trucks to the maintenance of trucks which have different EBITDA margins. Also, the firms in the sector are capital-intensive causing a higher beta for the firms. Next to that, technological and government influences could change the sector and therefore play a role in the valuation.

We investigated the factors that influence the free cash flows to the firm and therefore the firm value. The free cash flows to the firm are influenced by several factors, which are the revenue, the EBITDA margin, the revenue and cost synergies and growth rate. The EBITDA margin is influenced by the state of the economy and the revenue growth. Furthermore, when determining the growth rate used in the terminal value it also depends on the growth rate of the economy since it can not exceed this.

The WACC used as discount rate in the valuation is influenced by the debt-to-equity ratio, the cost of debt, cost of equity and tax rate. The cost of equity was determined using the CAPM (Brealey et al., 2017). By which we found additional factors that influence the value of the firm. The risk-free rate, the market risk premium and beta also influence the valuation. The risk-free rate used is based on the yield of a 30-year Dutch government bond. The levered beta incorporates the firm-specific conditions by levering the unlevered beta which represents the riskiness of firms in the industry. The beta was levered using the debt-to-equity ratio of the firms.

The tax conditions do also play a role in the valuation. The tax conditions are important when determining the operating income after taxes, influencing the free cash flows to the firm. Also, the WACC determination takes the tax rate into account. Furthermore, the tax rule of net operating losses can also be of importance for the valuation, when a firm made a loss in the previous years.

Lastly, the question to be answered was how to translate the impact of the factors into a support tool for valuation. We developed a tool in Excel, which consists of an input part, a calculation part and an output part.

So, to incorporate the influence of factors on the valuation, the tool takes these factors into account in several ways. Most of the factors that play a role are input values filled in by the user of the tool. Meaning, these depend on the company to be valued and the assumptions about the future. This information is filled in the input part of the tool, which is in the form of a question and answers box.

This information is processed in the calculation part of the tool, which determines the firm value for each scenario using the three valuation methods. This starts with the free cash flow to the firm model, which follows the calculations that were found in the previous research questions. The other valuation methods are based on the free cash flow to the firm model.

The WACC used in the tool is determined by levering the unlevered beta using the financial leverage, which is determined based on the input. The relationships between the state of the economy, the revenue growth and the EBITDA margin were modelled using a linear regression model. The result of this was an equation for determining the EBITDA margin that was incorporated in the tool. The output part of the tool shows the results of the valuation.

The results show that the tool is capable of incorporating different input values, which represent different companies under different scenarios. The calculations are done for the three valuation methods and can be seen in the calculation part. The output of the tool shows the difference between scenarios in the scenarios analysis part for the three valuation methods. This enables the user to compare the firm value under different conditions. Furthermore, the output of the tool does also provide a sensitivity analysis. This indicates the sensitivity of the firm value to the different factors influencing the valuation.

In conclusion, the main research question was answered by the development of the valuation support tool. This tool enables to value a firm in the company vehicles sector and to incorporate the sector-specific conditions and other factors influencing the valuation. The tool is capable of valuing a firm under different scenarios and providing a sensitivity analysis of the firm value. This gives an estimation of the acquisition value of the company.

8.2. Discussion

Our research contributes to theoretical knowledge by developing a method to capture the characteristics of a specific sector into the valuation. This was done by incorporating the effect of the sector-specific beta, the financial leverage and by modelling the behaviour of the EBITDA margin in the sector. The sector-specific characteristics were processed in the valuation tool. This method of incorporating sector-specific characteristics in a valuation method has to my knowledge not been described in literature and therefore this research adds new knowledge to the existing literature.

A practical contribution is that the tool captures the characteristics of the company vehicles sector into the valuation, which leads to a more accurate valuation of the firm. This contributes to practice, since a better consideration can be made on the amount to pay for a firm, since the value is better estimated. Also, no other public valuation tools are known that incorporate this, which makes the tool valuable.

Another practical contribution from the tool is the ability to estimate the firm value under several scenarios which give a better understanding of the firm value. This enables the user to understand the effect of the uncertainty of some input values. Furthermore, the sensitivity analysis provides firm values under different variable values, providing the user insights into what could happen to the value of the firm in the future if certain values would be different than expected. Also, often valuation tools give only one firm value, however a firm value is often in a range since not all of the input values used are certain. Therefore, this tool contributes to existing tools by providing values under different scenarios and ranges of firm values for changing inputs.

In addition, the tool makes a clear distinction between the revenue and cost synergies. This contributes to practice by the understanding of the effect of synergies on the firm value and multiples. Often these synergies are incorporated in the revenues or cost, making it difficult to see their impact on the valuation. Sometimes, the synergies are provided but are added separately to the firm value, making it difficult to see the relative effect on the EBITDA margin and free cash flows or economic value added.

The tool contributes to practice by providing transparency through the input, calculation and output part. By showing this the user of the tool can follow the calculations of the different methods and the choices made within the valuation. For example, the behaviour of the EBITDA margin can be better understood. Furthermore, this helps with evaluating how to create more value for a firm and with analysing the current performance of the firm. Often the valuation process is less transparent making it difficult to understand how the firm value is determined.

The limitations of the research are related to the valuation support tool, the data used and the validity of the research.

<u>The valuation support tool</u>

The valuation support tool has some limitations caused by the simplifications made. We assume that there are two distinct periods within the valuation, which are the first five years and the stable period. However, in reality these periods will not all be exactly the same. Within the five years, one year could have a different growth rate than the other four years. The tool does not provide the possibility to change this within the input. This trade-off was made for the convenience of the tool, since otherwise all values could be filled in by hand which requires more work. And often these specific one-year changes are very difficult to estimate making it unnecessary to provide this possibility in the tool.

Furthermore, the transition between years is abrupt meaning we do not take into account that, for example, the growth rate would increase or decrease gradually over years. The same applies to the economy growth rate. This is a simplified version of reality, since in reality a more smooth transition would probably occur.

Another limitation is that the tool does not always provide the possibility for sensitivity analysis to change multiple values at once, meaning that only the values for distinct periods are changed, such as the revenue growth rate of the first five years. This limitation was caused by the design of the tool, which has two different inputs for the revenue growth rates of the different periods. This could be solved by assuming that for the whole model the revenue growth rates are the same, however this would take away the possibility to make a distinction between the two periods, resulting in a simplified model.

The data

The data used are also a limitation of the research. A limited amount of data was available about the multiples in the industry and for determining the EBITDA margin. There is almost no information publicly available on the performance of the companies operating in the industry, such as their revenue and EBITDA. This makes it difficult to determine the multiples and to use the EBITDA margin of these companies for establishing the relationship between the economy and revenue growth rates on the one hand, and the EBITDA margin on the other. To remove this limitation, more information is required. This could be obtained by accessing more databases which often are paid databases. However, it is still not certain that comparable companies can be found.

In addition, since there was a limited amount of data available for determining the EBITDA margin, we made the assumption that the behaviour of the EBITDA margin would be similar for each EBITDA margin. Meaning that a rather low current EBITDA margin would react in the same way as a firm with a high current EBITDA margin. In reality, this sensitivity to the economy and revenue growth rate could be different but there was no data available to test this. Therefore, the simplification was made that the EBITDA margin would react similarly.

Furthermore, no beta was found for the company vehicles industry, therefore the assumption was made that a beta from a comparable industry could be used. This beta is probably different from that of the company vehicles sector and based on a different debt-to-equity ratio, making the estimation less reliable. Also, the found value from Damodaran (2021) was difficult to verify, due to the fact that no other reliable and free sources were found. This limitation could be solved by using a paid database in which comparable firms could be selected to determine a beta. This would improve the reliability of the WACC and therefore the valuation.

As explained in Section 4.4, there are different views on an appropriate risk-free rate. We made the choice to use a 30-year Dutch government bond for determining the risk-free rate, however it could be argued that this is not representative. The market risk premium used is also based on the view of one company, again due to the limited amount of available sources on this. It would be better to incorporate different market risk premium values in the tool to cover the potentially different views on this value. However, the sensitivity analysis does capture this partly, by changing the WACC value which would represent a different view on the risk-free rate or market risk premium.

The validity

The validity of the research is difficult to check, because the value of a firm is an estimation. This estimation is based on the assumption made by the analyst. There is not one value for the firm that is correct, so it is difficult to conclude if a valuation is correct. However, the use of the method of valuation can be compared to how other analysts use it, but this will only work for a very simplified version of the model. The reason for this is that, if already other analysts value the company in the same way by for example using the EBITDA margin behaviour, their method is not shared publicly and therefore cannot be compared. So, a simplified version of a valuation model could be used to check whether the firm value is consistent, but this would not cover the complexity of the valuation tool.

8.3. Recommendations

Our first recommendation is to use this support tool when valuing firms for a potential acquisition. This tool has the possibility to incorporate characteristics of the company vehicles sector and to determine the value of the firm under different scenarios. Furthermore, it performs a sensitivity analysis for some of the more uncertain variables needed. This will provide a more reliable estimation of the value of the firm to be acquired, which will benefit the acquisition process. However, the firm should always check the calculations part of the tool to see whether the values used in the calculation are feasible for the company. Otherwise, the value estimation does not make sense since it represents a firm in a situation which is not realistic.

Second, we recommend that the firm should consider for which part of the firm value they want to pay. A vision could be that after ten years, the buying firm has spent such an amount of effort and time in the firm that all the value is created by themselves. Therefore, the firm could consider not to pay for terminal value, since this value will only be created by them.

Third, we recommend to use the tool to reflect on estimations made in the past about the performance of the company. The tool can help with comparing the estimation with the reality. The firm can reflect whether their estimations were realistic and accomplished or if they missed something.

Lastly, we recommend examining the fixed and variable costs of the company operating in this sector. Since the firms in the industry are cyclical, the revenue growth and EBITDA margin are affected by the state of the economy. Since the companies have a high amount of fixed costs, they are rather vulnerable to a decrease in revenue. The companies then still have to pay their fixed costs, resulting in a potential loss. This does also affect the firm value, since negative cash flows will lead to a lower value. Therefore the companies in the industry should investigate how to decrease their fixed costs relative to their variable costs, such that they can downsize or grow based on the economy and therefore better withstand the cyclicality of the industry.

8.4. Further research

Future research could be focussed on how to forecast the economy and revenue growth rates of a firm, since these variables are difficult to estimate causing uncertainty in the value estimation. A better forecast of these growth rates will lead to a better estimation of the firm value.

For this tool, we chose to use the beta of a comparable industry. Due to the limited time available it was not possible to create an own group of comparable firms for determining an unlevered beta for the industry. Further research could focus on determining the beta for the company vehicles industry such that this beta can be used in the valuation tool. This would probably result in less difference between the financial leverages of firms.

Further research could focus on improving the modelling of the behaviour of the EBITDA margin, which would help with doing better value estimations of companies in this sector. This can be done by obtaining more information from several firms, to make the linear regression more reliable.

In addition, further research could investigate extending the modelling of the behaviour of the EBITDA margin for cyclical firms to other sectors. To do this, the method applied could be similar but the specific data for the other sectors should be used to derive the equations.

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Appendix A

The input part of the tool

Questions		Answers			
What is the company name?	**Company name**	**Company Y**			
	Scenario:	**Basis**	**Scenario 1**	**Scenario 2**	**Scenario 3**
	Description:	*Basis scenario*	*Higher economy growth*	*Lower economy growth*	*Lower EBITDA*
Information about recent year	**Input values * 1000€**				
	Tax rate	25%	25%	25%	25%
What is the amount of equity?	**Equity**	50	50	50	50
What is the amount of debt?	**Debt**	150	150	150	150
What is the cost of debt?	**Cost of debt**	5.00%	5.00%	5.00%	5.00%
What is the unlevered beta for the **industry**?	**Unlevered beta**	1.01	1.01	1.01	1.01
	Cost of equity	19.37%	19.37%	19.37%	19.37%
	Risk-free rate	0.50%	0.50%	0.50%	0.50%
	Market risk premium	5.75%	5.75%	5.75%	5.75%
	Beta	3.28	3.28	3.28	3.28
	WACC	7.66%	7.66%	7.66%	7.66%
What are the most recent year revenues?	**Revenue**	100	100	100	100
	Costs	-86	-86	-86	-89
What is the EBITDA margin?	EBITDA margin	*13.76%*	*13.76%*	*13.76%*	11.00%
	EBITDA excl synergies	13.76	13.76	13.76	11
	Revenue synergies	0	0	0	0
	Cost synergies	-5	-5	-5	-5
	EBITDA after synergies	8.76	8.76	8.76	6
	EBITDA margin after synergies	8.76%	8.76%	8.76%	6.00%
What is the most recent year depreciation	**Depreciation**	-1	-1	-1	-1
	Operating income or EBIT	7.76	7.76	7.76	5
	Interest expensens and income	-7.5	-7.5	-7.5	-7.5
	EBT	0.26	0.26	0.26	-2.5
	Tax	-0.07	-0.07	-0.07	0
	Net result	0.20	0.20	0.20	-2.5
Are the capital expenditures the same as the depreciation?		Yes	Yes	Yes	Yes
If not, what are the capital expenditures?	**Capital expenditures**	-1	-1	-1	-1
What is the working capital as percentage of the revenue?	**Changes in working capital**	12.5%	12.5%	12.5%	12.5%
	FCFF	18.32	18.32	18.32	16.25
What are the losses from previous years that may be carried forward?	Net Operating Losses	0	0	0	0
Upcoming years (1 - 5)					
Growth rate of Economy?	GDP growth rate	2%	3%	-1%	1%
Growth rate of Revenue?	Growth rate	2%	3%	-1%	1%
Will the EBITDA margin be the same as recent year?		Yes	Yes	Yes	Yes
If not, what will be the EBITDA margin?	EBITDA margin	62.50%	62.50%	62.50%	62.50%
Will the growth rate of the depreciation be the same as revenues?		Yes	Yes	Yes	Yes
If not, wat will be the growth rate of depreciation?	growth rate depreciation	2%	3%	-1%	1%
	Interest expenses	-7.5	-7.5	-7.5	-7.5
Will the capital expenditures be the same as the depreciation?		Yes	Yes	Yes	Yes
If not, wat will be the capital expenditures?	Capital expenditures	-100	-100	-100	-100
Will the working capital be the same percentage of the revenue as recent year?		Yes	Yes	Yes	Yes
If not, what will be the working capital as percentage of the revenue?	changes in working capital	15.00%	12.50%	12.50%	12.50%
	Revenue synergy year 1	0	0	0	0
	Revenue synergy year 2	0	0	0	0
	Revenue synergy year 3	0	0	0	0
	Revenue synergy year 4	0	0	0	0
	Revenue synergy year 5	0	0	0	0
	Cost synergy year 1	-5	-5	-5	-5
	Cost synergy year 2	-5	-5	-5	-5
	Cost synergy year 3	-5	-5	-5	-5
	Cost synergy year 4	-5	-5	-5	-5
	Cost synergy year 5	-5	-5	-5	-5
Stable period (6 - perpetuity)					
Growth rate of Economy?	GDP growth rate	1%	2%	1%	1%
Growth rate of revenues?	Growth rate	1%	2%	1%	1%
Will be the EBITDA margin be the same as in year 5?		Yes	Yes	Yes	Yes
If not, what will be the EBITDA margin?	EBITDA margin	0.00%	0.00%	0.00%	0.00%
	Revenue synergies	0	0	0	0
	Cost synergies	-5	-5	-5	-5
Will the growth rate of the depreciation be the same as revenues?		Yes	Yes	Yes	Yes
If not, wat will be the growth rate of depreciation	growth rate depreciation	1%	2%	1%	1%
	Interest expenses				
Will the capital expenditures be the same as the depreciation?		Yes	Yes	Yes	Yes
If not, wat will be the capital expenditures	capital expenditures	-100	-100	-100	-100
Will the working capital be the same percentage of the revenue as last 5 years?		Yes	Yes	Yes	Yes
If not, what will be the working capital as percentage of the revenue?	changes in working capital	20.00%	12.50%	12.50%	12.50%
Acquisiton price					
Bookvalue		50			
What is the amount of goodwill to be paid?		20			
Acquisiton price		70			
What are the average multiples of **industry**					
EV/EBITDA		4			
EV/EBIT		3			
EV/Sales		2			
What are the average acquisition price multiples of **industry**					
Multiple Acquisition price/EBITDA		4			
Multiple Acquisition price/EBIT		3			
Multiple Acquisition price/Revenue		2			

Information	Fill in values
	Do not fill in values
	Values do not match base scenario

What are the expected revenue and cost synergies?

Synergies							
Year	Basis	1	2	3	4	5	6 - perpetuity
Revenue							
Reason 1	0	0	0	0	0	0	0
Reason 2	0	0	0	0	0	0	0
Reason 3	0	0	0	0	0	0	0
Reason 4	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Cost							
Reason 1	0	0	0	0	0	0	0
Reason 2	0	0	0	0	0	0	0
Loan expenses	-5	-5	-5	-5	-5	-5	-5
Reason 4	0	0	0	0	0	0	0
Total	-5	-5	-5	-5	-5	-5	-5

The calculation part of the tool: Basis scenario

Company valuation of:	Company Y	Basis scenario										
DCF												
WACC	7.66%											
*Values * 1000 €*	*Base year*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	
Year	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**Terminal year**
Economy growth rate	0%	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Revenue growth rate	0%	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Revenue	100.00	102.00	104.04	106.12	108.24	110.41	111.51	112.63	113.75	114.89	116.04	117.20
Costs	-86.24	-88.80	-90.57	-92.38	-94.23	-96.12	-96.62	-97.59	-98.56	-99.55	-100.55	-101.55
EBITDA margin	*13.76%*	*12.94%*	*12.94%*	*12.94%*	*12.94%*	*12.94%*	*13.35%*	*13.35%*	*13.35%*	*13.35%*	*13.35%*	*13.35%*
EBITDA	13.76	13.20	13.47	13.74	14.01	14.29	14.89	15.04	15.19	15.34	15.49	15.65
Revenue synergies	0	0	0	0	0	0	0	0	0	0	0	0
Cost synergies	-5.00	-5.10	-5.10	-5.10	-5.10	-5.10	-5.05	-5.10	-5.15	-5.20	-5.26	-5.31
EBITDA after synergies	8.76	8.10	8.37	8.64	8.91	9.19	9.84	9.94	10.04	10.14	10.24	10.34
EBITDA margin after synergies	*8.76%*	*7.94%*	*8.04%*	*8.14%*	*8.23%*	*8.32%*	*8.82%*	*8.82%*	*8.82%*	*8.82%*	*8.82%*	*8.82%*
Depreciation	-1	-1.02	-1.04	-1.06	-1.08	-1.10	-1.12	-1.13	-1.14	-1.15	-1.16	-1.17
Operating income or EBIT	7.76	7.08	7.33	7.58	7.83	8.09	8.72	8.81	8.90	8.99	9.08	9.17
Interest expensens and income	-7.5	-7.65	-7.80	-7.96	-8.12	-8.28	-8.45	-8.62	-8.79	-8.96	-9.14	-9.23
EBT	0.26	-0.57	-0.48	-0.38	-0.29	-0.19	0.28	0.20	0.11	0.03	-0.06	-0.06
Tax	-0.07	0.00	0.00	0.00	0.00	0.00	-0.07	-0.05	-0.03	-0.01	0.00	0.00
Net result	0.20	-0.57	-0.48	-0.38	-0.29	-0.19	0.21	0.15	0.08	0.02	-0.06	-0.06
EBIT(1-t)	5.82	5.31	5.50	5.68	5.87	6.07	6.54	6.61	6.68	6.74	6.81	6.88
Capital expenditures	-1	-1.02	-1.04	-1.06	-1.08	-1.10	-1.12	-1.13	-1.14	-1.15	-1.16	-1.17
Change in working capital	-12.5	-0.25	-0.26	-0.26	-0.27	-0.27	-0.14	-0.14	-0.14	-0.14	-0.14	-0.15
FCFF	-6.68	5.06	5.24	5.42	5.61	5.79	6.41	6.47	6.53	6.60	6.67	6.73
Net Operating Losses	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV(FCFF)	39.93	45%										
PV(Terminal value)	48.37	55%										
NPV Firm value	**88.30**	100%										
EVA												
	Base year	1	2	3	4	5	6	7	8	9	10	
*Values * 1000€*	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**Terminal year**
EBIT(1-t)	5.82	5.31	5.50	5.68	5.87	6.07	6.54	6.61	6.68	6.74	6.81	6.88
Capital invested * WACC	15.31	15.31	15.33	15.35	15.37	15.39	15.41	15.42	15.43	15.44	15.45	1.11
EVA	-9.49	-10.00	-9.84	-9.67	-9.50	-9.33	-8.87	-8.81	-8.76	-8.70	-8.65	5.77
PV(EVA)	-63.47	-72%										
PV(Terminal value)	41.43	47%										
NPV	-22.04											
Capital invested	200	227%										
PV of change in capital invested at the e	-89.66	-102%										
Firm value	**88.30**	100%										
ROC		2.66%	2.74%	2.83%	2.92%	3.02%	3.25%	3.28%	3.31%	3.34%	3.37%	47.41%
Imputed capital												14.51
Capital invested												
Initial	200	200	200.25	200.51	200.77	201.03	201.30	201.44	201.58	201.72	201.86	202.01
Depreciation	-1.00	-1.02	-1.04	-1.06	-1.08	-1.10	-1.12	-1.13	-1.14	-1.15	-1.16	-1.17
Capital expenditures	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.13	1.14	1.15	1.16	1.17
Changes in working capital	12.50	0.25	0.26	0.26	0.27	0.27	0.14	0.14	0.14	0.14	0.14	0.15
End capital	212.50	200.25	200.51	200.77	201.03	201.30	201.44	201.58	201.72	201.86	202.01	202.15
Multiple		Incl synergies										
EV/EBITDA	6.10	9.45										
EV/EBIT	6.61	10.72										
EV/Sales	0.80	0.80										
Multiple of acquisition price												
Acquisition price/EBITDA	4.84											
Acquisition price/EBIT	8.49											
Acquisition price/Sales	0.64											
Firm value above acquisition price	18.30											

Firm value for WACC (x-axis) and growth rate (y-axis)

88.30	4.66%	5.66%	6.66%	**7.66%**	8.66%	9.66%	10.66%
-1%	131.31	103.38	85.32	72.68	63.33	56.14	50.44
0%	141.53	111.10	91.44	77.69	67.53	59.72	53.53
1%	152.15	119.13	97.80	82.89	71.89	63.43	56.74
2%	163.18	127.47	104.41	88.30	76.41	67.29	60.07
3%	174.65	136.13	111.27	93.91	81.11	71.29	63.53
4%	186.57	145.13	118.40	99.74	85.99	75.45	67.11
5%	198.94	154.47	125.79	105.78	91.05	79.75	70.83

Firm value for WACC (x-axis) and EBITDA (y-axis)

88.30	4.66%	5.66%	6.66%	**7.66%**	8.66%	9.66%	10.66%
11.8%	119.80	93.43	76.41	64.52	55.76	49.04	43.72
12.3%	130.64	101.94	83.41	70.47	60.92	53.60	47.80
12.8%	141.49	110.45	90.41	76.41	66.09	58.16	51.89
13.3%	152.34	118.96	97.41	82.35	71.25	62.73	55.98
13.8%	163.18	127.47	104.41	88.30	76.41	67.29	60.07
14.3%	174.03	135.98	111.41	94.24	81.58	71.86	64.16
14.8%	184.88	144.49	118.41	100.19	86.74	76.42	68.25
15.3%	195.73	153.00	125.41	106.13	91.91	80.98	72.34
15.8%	206.57	161.51	132.41	112.07	97.07	85.55	76.42

The calculation part of the tool: Scenario 1

Company valuation of:	Company Y	Scenario 1										
DCF												
WACC	7.66%											
*Values * 1000€*	*Base year*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	
Year	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**Terminal year**
Economy growth rate	0%	3%	3%	3%	3%	3%	2%	2%	2%	2%	2%	2%
Revenue growth rate	0%	3%	3%	3%	3%	3%	2%	2%	2%	2%	2%	2%
Revenue	100.00	103.00	106.09	109.27	112.55	115.93	118.25	120.61	123.02	125.48	127.99	130.55
Costs	-86.24	-90.09	-92.79	-95.57	-98.44	-101.40	-102.94	-105.00	-107.10	-109.24	-111.43	-113.65
EBITDA margin	*13.76%*	*12.54%*	*12.54%*	*12.54%*	*12.54%*	*12.54%*	*12.94%*	*12.94%*	*12.94%*	*12.94%*	*12.94%*	*12.94%*
EBITDA	13.76	12.91	13.30	13.70	14.11	14.53	15.31	15.61	15.92	16.24	16.57	16.90
Revenue synergies	0	0	0	0	0	0	0	0	0	0	0	0
Cost synergies	-5.00	-5.15	-5.15	-5.15	-5.15	-5.15	-5.10	-5.20	-5.31	-5.41	-5.52	-5.63
EBITDA after synergies	8.76	7.76	8.15	8.55	8.96	9.38	10.21	10.41	10.62	10.83	11.05	11.27
EBITDA margin after synergies	*8.76%*	*7.54%*	*7.68%*	*7.82%*	*7.96%*	*8.09%*	*8.63%*	*8.63%*	*8.63%*	*8.63%*	*8.63%*	*8.63%*
Depreciation	-1	-1.03	-1.06	-1.09	-1.13	-1.16	-1.18	-1.21	-1.23	-1.25	-1.28	-1.31
Operating income or EBIT	7.76	6.73	7.09	7.46	7.83	8.22	9.02	9.20	9.39	9.58	9.77	9.96
Interest expensens and income	-7.50	-7.73	-7.96	-8.20	-8.44	-8.69	-8.96	-9.22	-9.50	-9.79	-10.08	-10.28
EBT	0.26	-0.99	-0.87	-0.74	-0.61	-0.47	0.07	-0.02	-0.11	-0.21	-0.31	-0.32
Tax	-0.07	0.00	0.00	0.00	0.00	0.00	-0.02	0.00	0.00	0.00	0.00	0.00
Net result	0.20	-0.99	-0.87	-0.74	-0.61	-0.47	0.05	-0.02	-0.11	-0.21	-0.31	-0.32
EBIT(1-t)	5.82	5.05	5.32	5.59	5.88	6.17	6.77	6.90	7.04	7.18	7.33	7.47
Capital expenditures	-1.00	-1.03	-1.06	-1.09	-1.13	-1.16	-1.18	-1.21	-1.23	-1.25	-1.28	-1.31
Change in working capital	-12.50	-0.38	-0.39	-0.40	-0.41	-0.42	-0.29	-0.30	-0.30	-0.31	-0.31	-0.32
FCFF	-6.68	4.67	4.93	5.19	5.47	5.75	6.48	6.61	6.74	6.87	7.01	7.15
Net Operating Losses	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV(FCFF)	39.53	40%										
PV(Terminal value)	60.47	60%										
NPV Firm value	**100.00**	100%										
EVA												
	Base year	1	2	3	4	5	6	7	8	9	10	
*Values * 1000€*	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**Terminal year**
EBIT(1-t)	5.82	5.05	5.32	5.59	5.88	6.17	6.77	6.90	7.04	7.18	7.33	7.47
Capital invested * WACC	15.31	15.31	15.34	15.37	15.40	15.43	15.46	15.49	15.51	15.53	15.56	1.22
EVA	-9.49	-10.26	-10.02	-9.78	-9.53	-9.26	-8.70	-8.58	-8.47	-8.35	-8.23	6.25
PV(EVA)	-63.16	-63%										
PV(Terminal value)	52.82	53%										
NPV	-10.34											
Capital invested	200	200%										
PV of change in capital invested at the e	-89.66	-90%										
Firm value	**100.00**	100%										
ROC		2.52%	2.65%	2.79%	2.92%	3.06%	3.35%	3.41%	3.48%	3.54%	3.61%	46.70%
Imputed capital												16.00
Capital invested												
Initial	200	200	200.38	200.76	201.16	201.57	201.99	202.28	202.58	202.88	203.19	203.50
Depreciation	-1.00	-1.03	-1.06	-1.09	-1.13	-1.16	-1.18	-1.21	-1.23	-1.25	-1.28	-1.31
Capital expenditures	1.00	1.03	1.06	1.09	1.13	1.16	1.18	1.21	1.23	1.25	1.28	1.31
Changes in working capital	12.50	0.38	0.39	0.40	0.41	0.42	0.29	0.30	0.30	0.31	0.31	0.32
End capital	212.50	200.38	200.76	201.16	201.57	201.99	202.28	202.58	202.88	203.19	203.50	203.82
Multiple		Incl synergies										
EV/EBITDA	6.75	10.43										
EV/EBIT	7.32	11.86										
EV/Sales	0.86	0.86										
Multiple of acquisition price												
Acquisition price/EBITDA	4.72											
Acquisition price/EBIT	8.30											
Acquisition price/Sales	0.60											
Firm value above acquisition price	18.30											

Firm value for WACC (x-axis) and growth rate (y-axis)

100.00	4.66%	5.66%	6.66%	**7.66%**	8.66%	9.66%	10.66%
0%	173.45	126.22	99.27	81.85	69.66	60.65	53.71
1%	187.37	135.95	106.62	87.67	74.42	64.63	57.11
2%	201.84	146.06	114.26	93.72	79.36	68.77	60.64
3%	216.88	156.56	122.19	100.00	84.50	73.07	64.30
4%	232.51	167.47	130.42	106.52	89.83	77.53	68.09
5%	248.73	178.80	138.97	113.29	95.36	82.16	72.03
6%	265.58	190.56	147.85	120.31	101.10	86.96	76.12

Firm value for WACC (x-axis) and EBITDA (y-axis)

100.00	4.66%	5.66%	6.66%	**7.66%**	8.66%	9.66%	10.66%
11.8%	156.54	112.76	87.82	71.73	60.50	52.22	45.87
12.3%	171.63	123.71	96.41	78.80	66.50	57.43	50.47
12.8%	186.71	134.66	105.01	85.87	72.50	62.64	55.08
13.3%	201.80	145.61	113.60	92.93	78.50	67.86	59.69
13.8%	216.88	156.56	122.19	100.00	84.50	73.07	64.30
14.3%	231.97	167.51	130.78	107.07	90.50	78.28	68.90
14.8%	247.05	178.46	139.37	114.13	96.50	83.50	73.51
15.3%	262.14	189.41	147.96	121.20	102.50	88.71	78.12
15.8%	277.22	200.36	156.55	128.27	108.50	93.92	82.73

The calculation part of the tool: Scenario 2

Company valuation of:	Company Y	Scenario 2										
DCF												
WACC	7.66%											
*Values * 1000 €*	*Base year*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	
Year	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**Terminal year**
Economy growth rate	0%	-1%	-1%	-1%	-1%	-1%	1%	1%	1%	1%	1%	1%
Revenue growth rate	0%	-1%	-1%	-1%	-1%	-1%	1%	1%	1%	1%	1%	1%
Revenue	100.00	99.00	98.01	97.03	96.06	95.10	96.05	97.01	97.98	98.96	99.95	100.95
Costs	-86.24	-84.97	-84.12	-83.28	-82.45	-81.62	-83.22	-84.06	-84.90	-85.75	-86.60	-87.47
EBITDA margin	*13.76%*	*14.17%*	*14.17%*	*14.17%*	*14.17%*	*14.17%*	*13.35%*	*13.35%*	*13.35%*	*13.35%*	*13.35%*	*13.35%*
EBITDA	13.76	14.03	13.89	13.75	13.61	13.48	12.83	12.95	13.08	13.21	13.35	13.48
Revenue synergies	0	0	0	0	0	0	0	0	0	0	0	0
Cost synergies	-5.00	-4.95	-4.95	-4.95	-4.95	-4.95	-5.05	-5.10	-5.15	-5.20	-5.26	-5.31
EBITDA after synergies	8.76	9.08	8.94	8.80	8.66	8.53	7.78	7.85	7.93	8.01	8.09	8.17
EBITDA margin after synergies	*8.76%*	*9.17%*	*9.12%*	*9.07%*	*9.02%*	*8.96%*	*8.09%*	*8.09%*	*8.09%*	*8.09%*	*8.09%*	*8.09%*
Depreciation	-1.00	-0.99	-0.98	-0.97	-0.96	-0.95	-0.96	-0.97	-0.98	-0.99	-1.00	-1.01
Operating income or EBIT	7.76	8.09	7.96	7.83	7.70	7.57	6.81	6.88	6.95	7.02	7.09	7.16
Interest expensens and income	-7.50	-7.43	-7.35	-7.28	-7.20	-7.13	-7.06	-6.99	-6.92	-6.85	-6.78	-6.85
EBT	0.26	0.66	0.61	0.55	0.50	0.44	-0.25	-0.11	0.03	0.17	0.31	0.31
Tax	-0.07	-0.17	-0.15	-0.14	-0.12	-0.11	0.00	0.00	-0.01	-0.04	-0.08	-0.08
Net result	0.20	0.50	0.46	0.41	0.37	0.33	-0.25	-0.11	0.02	0.13	0.23	0.23
EBIT(1-t)	5.82	6.07	5.97	5.87	5.78	5.68	5.11	5.16	5.21	5.27	5.32	5.37
Capital expenditures	-1.00	-0.99	-0.98	-0.97	-0.96	-0.95	-0.96	-0.97	-0.98	-0.99	-1.00	-1.01
Change in working capital	-12.50	0.13	0.12	0.12	0.12	0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12
FCFF	-6.68	6.19	6.09	5.99	5.90	5.80	4.99	5.04	5.09	5.14	5.19	5.25
Net Operating Losses	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV(FCFF)	38.38	50%										
PV(Terminal value)	37.70	50%										
NPV Firm value	**76.08**	100%										
EVA												
	Base year	1	2	3	4	5	6	7	8	9	10	
*Values * 1000€*	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**Terminal year**
EBIT(1-t)	5.82	6.07	5.97	5.87	5.78	5.68	5.11	5.16	5.21	5.27	5.32	5.37
Capital invested * WACC	15.31	15.31	15.30	15.29	15.28	15.27	15.27	15.27	15.28	15.29	15.30	0.96
EVA	-9.49	-9.25	-9.33	-9.42	-9.51	-9.59	-10.15	-10.11	-10.07	-10.03	-9.98	4.42
PV(EVA)	-65.98	-87%										
PV(Terminal value)	31.72	42%										
NPV	-34.26											
Capital invested	200	263%										
PV of change in capital invested at the e	-89.66	-118%										
Firm value	**76.08**	100%										
ROC		3.03%	2.99%	2.94%	2.89%	2.85%	2.56%	2.59%	2.61%	2.64%	2.66%	43.00%
Imputed capital												12.49
Capital invested												
Initial	200	200	199.88	199.75	199.63	199.51	199.39	199.51	199.63	199.75	199.87	199.99
Depreciation	-1.00	-0.99	-0.98	-0.97	-0.96	-0.95	-0.96	-0.97	-0.98	-0.99	-1.00	-1.01
Capital expenditures	1.00	0.99	0.98	0.97	0.96	0.95	0.96	0.97	0.98	0.99	1.00	1.01
Changes in working capital	12.50	-0.13	-0.12	-0.12	-0.12	-0.12	0.12	0.12	0.12	0.12	0.12	0.12
End capital	212.50	199.88	199.75	199.63	199.51	199.39	199.51	199.63	199.75	199.87	199.99	200.12
Multiple		Incl synergies										
EV/EBITDA	5.67	9.09										
EV/EBIT	6.11	10.29										
EV/Sales	0.78	0.78										
Multiple of acquisition price												
Acquisition price/EBITDA	5.22											
Acquisition price/EBIT	9.47											
Acquisition price/Sales	0.72											
Firm value above acquisition price	6.08											

Firm value for WACC (x-axis) and growth rate (y-axis)							
76.08	4.66%	5.66%	6.66%	**7.66%**	8.66%	9.66%	10.66%
-4%	106.37	85.25	71.54	61.89	54.72	49.16	44.73
-3%	115.53	92.21	77.07	66.43	58.54	52.44	47.57
-2%	125.07	99.44	82.82	71.16	62.51	55.84	50.52
-1%	135.00	106.97	88.81	76.08	66.64	59.37	53.58
0%	145.32	114.79	95.03	81.18	70.94	63.04	56.76
1%	156.05	122.93	101.50	86.49	75.39	66.85	60.07
2%	167.20	131.38	108.21	92.00	80.02	70.80	63.49

Firm value for WACC (x-axis) and EBITDA (y-axis)							
76.08	4.66%	5.66%	6.66%	**7.66%**	8.66%	9.66%	10.66%
11.8%	97.24	77.27	64.32	55.24	48.50	43.29	39.15
12.3%	106.68	84.69	70.44	60.45	53.03	47.31	42.76
12.8%	116.12	92.12	76.57	65.66	57.57	51.33	46.37
13.3%	125.56	99.54	82.69	70.87	62.11	55.35	49.98
13.8%	135.00	106.97	88.81	76.08	66.64	59.37	53.58
14.3%	144.44	114.39	94.93	81.29	71.18	63.39	57.19
14.8%	153.87	121.82	101.05	86.50	75.72	67.41	60.80
15.3%	163.31	129.24	107.18	91.71	80.25	71.43	64.41
15.8%	172.75	136.67	113.30	96.92	84.79	75.44	68.01

The calculation part of the tool: Scenario 3

Company valuation of:	Company Y	Scenario 3										
DCF												
WACC	7.66%											
*Values * 1000 €*	*Base year*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	
Year	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**Terminal year**
Economy growth rate	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Revenue growth rate	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Revenue	100.00	101.00	102.01	103.03	104.06	105.10	106.15	107.21	108.29	109.37	110.46	111.57
Costs	-89.00	-90.30	-91.21	-92.12	-93.04	-93.97	-94.91	-95.86	-96.82	-97.78	-98.76	-99.75
EBITDA margin	*11.00%*	*10.59%*	*10.59%*	*10.59%*	*10.59%*	*10.59%*	*10.59%*	*10.59%*	*10.59%*	*10.59%*	*10.59%*	*10.59%*
EBITDA	11.00	10.70	10.80	10.91	11.02	11.13	11.24	11.36	11.47	11.58	11.70	11.82
Revenue synergies	0	0	0	0	0	0	0	0	0	0	0	0
Cost synergies	-5.00	-5.05	-5.05	-5.05	-5.05	-5.05	-5.05	-5.10	-5.15	-5.20	-5.26	-5.31
EBITDA after synergies	6.00	5.65	5.75	5.86	5.97	6.08	6.19	6.26	6.32	6.38	6.44	6.51
EBITDA margin after synergies	*6.00%*	*5.59%*	*5.64%*	*5.69%*	*5.74%*	*5.79%*	*5.83%*	*5.83%*	*5.83%*	*5.83%*	*5.83%*	*5.83%*
Depreciation	-1.00	-1.01	-1.02	-1.03	-1.04	-1.05	-1.06	-1.07	-1.08	-1.09	-1.10	-1.12
Operating income or EBIT	5.00	4.64	4.73	4.83	4.93	5.03	5.13	5.18	5.23	5.29	5.34	5.39
Interest expensens and income	-7.5	-7.575	-7.65	-7.73	-7.80	-7.88	-7.96	-8.04	-8.12	-8.20	-8.28	-8.37
EBT	-2.50	-2.94	-2.92	-2.90	-2.87	-2.85	-2.83	-2.86	-2.89	-2.92	-2.94	-2.97
Tax	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net result	-2.50	-2.94	-2.92	-2.90	-2.87	-2.85	-2.83	-2.86	-2.89	-2.92	-2.94	-2.97
EBIT(1-t)	3.75	3.48	3.55	3.62	3.70	3.77	3.85	3.89	3.93	3.97	4.01	4.05
Capital expenditures	-1.00	-1.01	-1.02	-1.03	-1.04	-1.05	-1.06	-1.07	-1.08	-1.09	-1.10	-1.12
Change in working capital	-12.50	-0.13	-0.13	-0.13	-0.13	-0.13	-0.13	-0.13	-0.13	-0.14	-0.14	-0.14
FCFF	-8.75	3.35	3.42	3.50	3.57	3.64	3.72	3.75	3.79	3.83	3.87	3.91
Net Operating Losses	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV(FCFF)	24.60	47%										
PV(Terminal value)	28.07	53%										
NPV Firm value	**52.67**	100%										
EVA												
	Base year	1	2	3	4	5	6	7	8	9	10	
*Values * 1000€*	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**Terminal year**
EBIT(1-t)	3.75	3.48	3.55	3.62	3.70	3.77	3.85	3.89	3.93	3.97	4.01	4.05
Capital invested * WACC	15.31	15.31	15.32	15.33	15.34	15.35	15.36	15.37	15.38	15.39	15.40	1.06
EVA	-11.56	-11.83	-11.77	-11.71	-11.64	-11.58	-11.51	-11.48	-11.46	-11.43	-11.40	2.99
PV(EVA)	-79.13	-150%										
PV(Terminal value)	21.47	41%										
NPV	-57.67											
Capital invested	200	380%										
PV of change in capital invested at the e	-89.66	-170%										
Firm value	**52.67**	100%										
ROC		1.74%	1.77%	1.81%	1.85%	1.88%	1.92%	1.94%	1.95%	1.97%	1.99%	29.30%
Imputed capital												13.81
Capital invested												
Initial	200	200	200.13	200.25	200.38	200.51	200.64	200.77	200.90	201.04	201.17	201.31
Depreciation	-1.00	-1.01	-1.02	-1.03	-1.04	-1.05	-1.06	-1.07	-1.08	-1.09	-1.10	-1.12
Capital expenditures	1.00	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	1.12
Changes in working capital	12.50	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.14	0.14
End capital	212.50	200.13	200.25	200.38	200.51	200.64	200.77	200.90	201.04	201.17	201.31	201.45
Multiple		Incl synergies										
EV/EBITDA	4.71	8.65										
EV/EBIT	5.20	10.46										
EV/Sales	0.50	0.50										
Multiple of acquisition price												
Acquisition price/EBITDA	6.25											
Acquisition price/EBIT	13.90											
Acquisition price/Sales	0.66											
Firm value above acquisition price	-17.33											

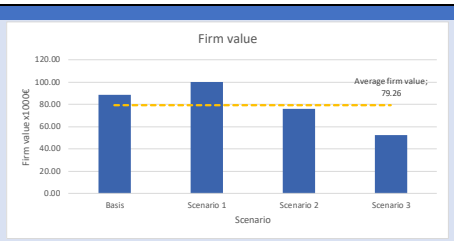
Firm value for WACC (x-axis) and growth rate (y-axis)							
52.67	4.66%	5.66%	6.66%	**7.66%**	8.66%	9.66%	10.66%
-2%	72.96	57.97	48.26	41.44	36.39	32.49	29.38
-1%	80.42	63.58	52.68	45.04	39.38	35.03	31.56
0%	88.17	69.41	57.28	48.78	42.50	37.67	33.83
1%	96.24	75.47	62.05	52.67	45.74	40.41	36.19
2%	104.63	81.78	67.02	56.71	49.10	43.26	38.63
3%	113.34	88.32	72.18	60.91	52.59	46.22	41.17
4%	122.39	95.12	77.53	65.26	56.22	49.29	43.81

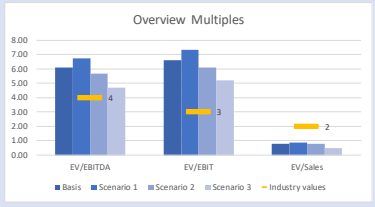
Firm value for WACC (x-axis) and EBITDA (y-axis)							
52.67	4.66%	5.66%	6.66%	**7.66%**	8.66%	9.66%	10.66%
9.0%	54.80	42.94	35.27	29.91	25.95	22.91	20.50
9.5%	65.16	51.07	41.97	35.60	30.90	27.28	24.42
10.0%	75.52	59.21	48.66	41.29	35.84	31.66	28.34
10.5%	85.88	67.34	55.36	46.98	40.79	36.03	32.27
11.0%	96.24	75.47	62.05	52.67	45.74	40.41	36.19
11.5%	106.60	83.61	68.75	58.36	50.69	44.79	40.11
12.0%	116.96	91.74	75.45	64.05	55.63	49.16	44.03
12.5%	127.32	99.88	82.14	69.74	60.58	53.54	47.95
13.0%	137.68	108.01	88.84	75.43	65.53	57.91	51.88

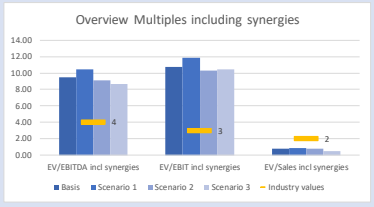
The output part of the tool

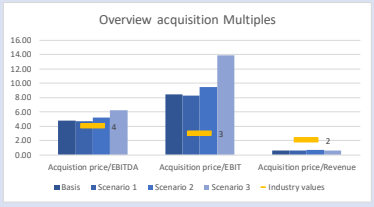
Scenario comparison — Value x1000€

Scenario	Industry values	Basis	Scenario 1	Scenario 2	Scenario 3
Firm value	-	88.30	100.00	76.08	52.67
EV/EBITDA	4	6.10	6.75	5.67	4.71
EV/EBIT	3	6.61	7.32	6.11	5.20
EV/Sales	2	0.80	0.86	0.78	0.50
EV/EBITDA incl synergies	4	9.45	10.43	9.09	8.65
EV/EBIT incl synergies	3	10.72	11.86	10.29	10.46
EV/Sales incl synergies	2	0.80	0.86	0.78	0.50
Acquistion price/EBITDA	4	4.84	4.72	5.22	6.25
Acquisition price/EBIT	3	8.49	8.30	9.47	13.90
Acquisition price/Revenue	2	0.64	0.60	0.72	0.66
Firm value above acquisition price		18.30	30.00	6.08	-17.33

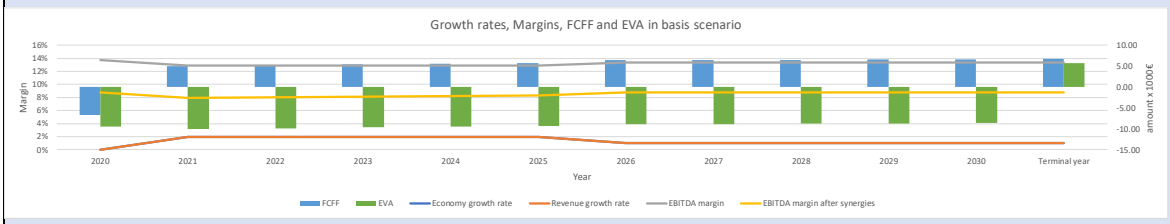


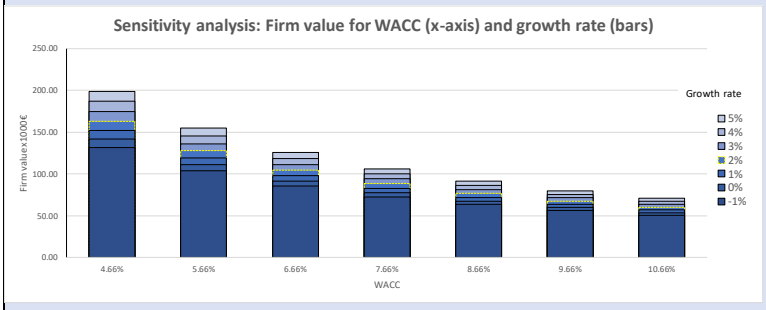






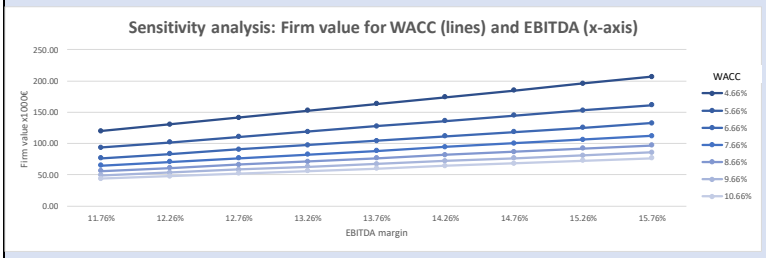
Sensitivity analysis Basis scenario





Firm value for WACC (x-axis) and growth rate (y-axis)

88.30	4.66%	5.66%	6.66%	**7.66%**	8.66%	9.66%	10.66%
-1%	131.31	103.38	85.32	72.68	63.33	56.14	50.44
0%	141.53	111.10	91.44	77.69	67.53	59.72	53.53
1%	152.15	119.13	97.80	82.89	71.89	63.43	56.74
2%	163.18	127.47	104.41	88.30	76.41	67.29	60.07
3%	174.65	136.13	111.27	93.91	81.11	71.29	63.53
4%	186.57	145.13	118.40	99.74	85.99	75.45	67.11
5%	198.94	154.47	125.79	105.78	91.05	79.75	70.83



Firm value for WACC (x-axis) and EBITDA (y-axis)

88.30	4.66%	5.66%	6.66%	**7.66%**	8.66%	9.66%	10.66%
11.8%	119.80	93.43	76.41	64.52	55.76	49.04	43.72
12.3%	130.64	101.94	83.41	70.47	60.92	53.60	47.80
12.8%	141.49	110.45	90.41	76.41	66.09	58.16	51.89
13.3%	152.34	118.96	97.41	82.35	71.25	62.73	55.98
13.8%	163.18	127.47	104.41	88.30	76.41	67.29	60.07
14.3%	174.03	135.98	111.41	94.24	81.58	71.86	64.16
14.8%	184.88	144.49	118.41	100.19	86.74	76.42	68.25
15.3%	195.73	153.00	125.41	106.13	91.91	80.98	72.34
15.8%	206.57	161.51	132.41	112.07	97.07	85.55	76.42

Appendix B

Input values Company A

Questions		Answers			
What is the company name?	**Company name**	**Company Y**			
	Scenario:	**Basis**	**Scenario 1**	**Scenario 2**	**Scenario 3**
	Description:	*Basis scenario*	*Higher economy growth*	*Lower economy growth*	*Lower EBITDA*
Information about recent year	**Input values * 1000€**				
	Tax rate	25%	25%	25%	25%
What is the amount of equity?	**Equity**	5000	5000	5000	5000
What is the amount of debt?	**Debt**	15000	15000	15000	15000
What is the cost of debt?	**Cost of debt**	5.00%	5.00%	5.00%	5.00%
What is the unlevered beta for the **industry**?	**Unlevered beta**	1.01	1.01	1.01	1.01
	Cost of equity	19.37%	19.37%	19.37%	19.37%
	Risk-free rate	0.50%	0.50%	0.50%	0.50%
	Market risk premium	5.75%	5.75%	5.75%	5.75%
	Beta	3.28	3.28	3.28	3.28
	WACC	7.66%	7.66%	7.66%	7.66%
What are the most recent year revenues?	**Revenue**	100000	100000	100000	100000
	Costs	-85,000	-85,000	-85,000	-89,000
What is the EBITDA margin?	EBITDA margin	*15.00%*	*15.00%*	*15.00%*	11.00%
	EBITDA excl synergies	15000.00	15000.00	15000.00	11000
	Revenue synergies	200	200	200	200
	Cost synergies	-1000	-1000	-1000	-1000
	EBITDA after synergies	14200.00	14200.00	14200.00	10200
	EBITDA margin after synergies	14.17%	14.17%	14.17%	10.18%
What is the most recent year depreciation	**Depreciation**	-2000	-2000	-2000	-2000
	Operating income or EBIT	12200.00	12200.00	12200.00	8200
	Interest expensens and income	-750	-750	-750	-750
	EBT	11450.00	11450.00	11450.00	7450
	Tax	-2862.50	-2862.50	-2862.50	-1862.5
	Net result	8587.50	8587.50	8587.50	5587.5
Are the capital expenditures the same as the depreciation?		Yes	Yes	Yes	Yes
If not, what are the capital expenditures?	**Capital expenditures**	-2000	-2000	-2000	-2000
What is the working capital as percentage of the revenue?	**Changes in working capital**	12.5%	12.5%	12.5%	12.5%
	FCFF	21650.00	21650.00	21650.00	18650.00
What are the losses from previous years that may be carried forward?	Net Operating Losses	0	0	0	0
Upcoming years (1 - 5)					
Growth rate of Economy?	GDP growth rate	2.0%	3.0%	-1.0%	1.0%
Growth rate of Revenue?	Growth rate	2.0%	3.0%	-1.0%	1.0%
Will the EBITDA margin be the same as recent year?		Yes	Yes	Yes	Yes
If not, what will be the EBITDA margin?	EBITDA margin	62.50%	62.50%	62.50%	62.50%
Will the growth rate of the depreciation be the same as revenues?		Yes	Yes	Yes	Yes
If not, wat will be the growth rate of depreciation?	growth rate depreciation	2%	3%	-1%	1%
	Interest expenses	-750	-750	-750	-750
Will the capital expenditures be the same as the depreciation?		Yes	Yes	Yes	Yes
If not, wat will be the capital expenditures?	Capital expenditures	-100	-100	-100	-100
Will the working capital be the same percentage of the revenue as recent year?		Yes	Yes	Yes	Yes
If not, what will be the working capital as percentage of the revenue?	changes in working capital	15.00%	12.50%	12.50%	12.50%
	Revenue synergy year 1	200	200	200	200
	Revenue synergy year 2	200	200	200	200
	Revenue synergy year 3	200	200	200	200
	Revenue synergy year 4	200	200	200	200
	Revenue synergy year 5	200	200	200	200
	Cost synergy year 1	-1000	-1000	-1000	-1000
	Cost synergy year 2	-1000	-1000	-1000	-1000
	Cost synergy year 3	500	500	500	500
	Cost synergy year 4	500	500	500	500
	Cost synergy year 5	500	500	500	500
Stable period (6 - perpetuity)					
Growth rate of Economy?	GDP growth rate	1.0%	2.0%	0.5%	1.0%
Growth rate of revenues?	Growth rate	1.0%	2.0%	0.5%	1.0%
Will be the EBITDA margin be the same as in year 5?		Yes	Yes	Yes	Yes
if not, what will be the EBITDA margin?	EBITDA margin	0.00%	0.00%	0.00%	0.00%
	Revenue synergies	200	200	200	200
	Cost synergies	250	250	250	250
Will the growth rate of the depreciation be the same as revenues?		Yes	Yes	Yes	Yes
If not, wat will be the growth rate of depreciation	growth rate depreciation	1.0%	2.0%	0.5%	1.0%
	Interest expenses				
Will the capital expenditures be the same as the depreciation?		Yes	Yes	Yes	Yes
If not, wat will be the capital expenditures	capital expenditures	-100	-100	-100	-100
Will the working capital be the same percentage of the revenue as last 5 years?		Yes	Yes	Yes	Yes
If not, what will be the working capital as percentage of the revenue?	changes in working capital	20.00%	12.50%	12.50%	12.50%
Acquisiton price					
Bookvalue		5000			
What is the amount of goodwill to be paid?		20000			
Acquisiton price		25000			
What are the average multiples of **industry**					
EV/EBITDA	12				
EV/EBIT	11				
EV/Sales	2				
What are the average acquisition price multiples of **industry**					
Multiple Acquisition price/EBITDA	4				
Multiple Acquisition price/EBIT	3				
Multiple Acquisition price/Revenue	2				

Input values synergies Company A

What are the expected revenue and cost synergies?							
Synergies							
Year	Basis	1	2	3	4	5	6 - perpetuity
Revenue							
Size bonusses	200	200	200	200	200	200	200
Reason 2	0	0	0	0	0	0	0
Reason 3	0	0	0	0	0	0	0
Reason 4	0	0	0	0	0	0	0
Total	200	200	200	200	200	200	200
Cost							
ICT system	-200	-200	-200	100	100	100	50
Loan expenses	-800	-800	-800	400	400	400	200
Reason 3	0	0	0	0	0	0	0
Reason 4	0	0	0	0	0	0	0
Total	-1000	-1000	-1000	500	500	500	250

Input values Company B

Questions		Answers			
What is the company name?	**Company name**	**Company B**			
	Scenario:	**Basis**	**Scenario 1**	**Scenario 2**	**Scenario 3**
	Description:	*Basis scenario*	*Higher economy growth*	*Lower economy growth*	*Lower EBITDA*
Information about recent year	**Input values * 1000€**				
	Tax rate	25%	25%	25%	25%
What is the amount of equity?	**Equity**	2000	2000	2000	2000
What is the amount of debt?	**Debt**	8000	8000	8000	8000
What is the cost of debt?	**Cost of debt**	5.00%	5.00%	5.00%	5.00%
What is the unlevered beta for the **industry**?	**Unlevered beta**	1.01	1.01	1.01	1.01
	Cost of equity	23.73%	23.73%	23.73%	23.73%
	Risk-free rate	0.50%	0.50%	0.50%	0.50%
	Market risk premium	5.75%	5.75%	5.75%	5.75%
	Beta	4.04	4.04	4.04	4.04
	WACC	7.75%	7.75%	7.75%	7.75%
What are the most recent year revenues?	**Revenue**	50000	50000	50000	50000
	Costs	-47,500	-47,500	-47,500	-48,500
What is the EBITDA margin?	EBITDA margin	*5.00%*	*5.00%*	*5.00%*	3.00%
	EBITDA excl synergies	2500.00	2500.00	2500.00	1500
	Revenue synergies	0	0	0	0
	Cost synergies	-750	-750	-750	-750
	EBITDA after synergies	1750.00	1750.00	1750.00	750
	EBITDA margin after synergies	3.50%	3.50%	3.50%	1.50%
What is the most recent year depreciation	**Depreciation**	-1000	-1000	-1000	-1000
	Operating income or EBIT	750.00	750.00	750.00	-250
	Interest expensens and income	-400	-400	-400	-400
	EBT	350.00	350.00	350.00	-650
	Tax	-87.50	-87.50	-87.50	0
	Net result	262.50	262.50	262.50	-650
Are the capital expenditures the same as the depreciation?		Yes	Yes	Yes	Yes
If not, what are the capital expenditures?	**Capital expenditures**	-1000	-1000	-1000	-1000
What is the working capital as percentage of the revenue?	**Changes in working capital**	12.5%	12.5%	12.5%	12.5%
	FCFF	6812.50	6812.50	6812.50	6062.50
What are the losses from previous years that may be carried forward?	Net Operating Losses	1000	1000	1000	1000
Upcoming years (1 - 5)					
Growth rate of Economy?	GDP growth rate	2.0%	3.0%	-1.0%	2.0%
Growth rate of Revenue?	Growth rate	2.0%	3.0%	-1.0%	2.0%
Will the EBITDA margin be the same as recent year?		Yes	Yes	Yes	Yes
If not, what will be the EBITDA margin?	EBITDA margin	62.50%	62.50%	62.50%	62.50%
Will the growth rate of the depreciation be the same as revenues?		Yes	Yes	Yes	Yes
If not, wat will be the growth rate of depreciation?	growth rate depreciation	2.0%	3.0%	-1.0%	2.0%
	Interest expenses	-400	-400	-400	-400
Will the capital expenditures be the same as the depreciation?		Yes	Yes	Yes	Yes
If not, wat will be the capital expenditures?	Capital expenditures	-1000	-1000	-1000	-1000
Will the working capital be the same percentage of the revenue as recent year?		Yes	Yes	Yes	Yes
If not, what will be the working capital as percentage of the revenue?	changes in working capital	12.50%	12.50%	12.50%	12.50%
	Revenue synergy year 1	0	0	0	0
	Revenue synergy year 2	0	0	0	0
	Revenue synergy year 3	0	0	0	0
	Revenue synergy year 4	0	0	0	0
	Revenue synergy year 5	0	0	0	0
	Cost synergy year 1	-750	-750	-750	-750
	Cost synergy year 2	-750	-750	-750	-750
	Cost synergy year 3	350	350	350	350
	Cost synergy year 4	350	350	350	350
	Cost synergy year 5	350	350	350	350
Stable period (6 - perpetuity)					
Growth rate of Economy?	GDP growth rate	1.0%	2.0%	0.5%	1.0%
Growth rate of revenues?	Growth rate	1.0%	2.0%	0.5%	1.0%
Will be the EBITDA margin be the same as in year 5?		Yes	Yes	Yes	Yes
if not, what will be the EBITDA margin?	EBITDA margin	0.00%	0.00%	0.00%	0.00%
	Revenue synergies	0	0	0	0
	Cost synergies	350	350	350	350
Will the growth rate of the depreciation be the same as revenues?		Yes	Yes	Yes	Yes
If not, wat will be the growth rate of depreciation	growth rate depreciation	1.0%	2.0%	0.5%	1.0%
	Interest expenses				
Will the capital expenditures be the same as the depreciation?		Yes	Yes	Yes	Yes
If not, wat will be the capital expenditures	capital expenditures	-1000	-1000	-1000	-1000
Will the working capital be the same percentage of the revenue as last 5 years?		Yes	Yes	Yes	Yes
If not, what will be the working capital as percentage of the revenue?	changes in working capital	12.50%	12.50%	12.50%	12.50%
Acquisiton price					
Bookvalue		2000			
What is the amount of goodwill to be paid?		8000			
Acquisiton price		10000			
What are the average multiples of **industry**					
EV/EBITDA	12				
EV/EBIT	11				
EV/Sales	2				
What are the average acquisition price multiples of **industry**					
Multiple Acquisition price/EBITDA	4				
Multiple Acquisition price/EBIT	3				
Multiple Acquisition price/Revenue	2				

Input values synergies Company B

What are the expected revenue and cost synergies?							
Synergies							
Year	Basis	1	2	3	4	5	6 - perpetuity
Revenue							
Reason 1	0	0	0	0	0	0	0
Reason 2	0	0	0	0	0	0	0
Reason 3	0	0	0	0	0	0	0
Reason 4	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Cost							
ICT system	-500	-500	-500	250	250	250	250
Loan expenses	-250	-250	-250	100	100	100	100
Reason 3	0	0	0	0	0	0	0
Reason 4	0	0	0	0	0	0	0
Total	-750	-750	-750	350	350	350	350