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Dissecting the theory-practice gap

- A study of the capital budgeting processes of large Swedish
Industrial Machinery firms

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Executive summary

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Title

Dissecting the theory-practice gap - A study of the capital budgeting processes of large Swedish Industrial Machinery firms.

Background and academic problem

A firm's success depends on its ability to allocate capital to productive use. This is carried out through a process referred to as capital budgeting. Previous research shows that the theory-preferred sophisticated Capital Budgeting Techniques (CBT) are becoming increasingly popular with time but that European and Swedish Industrial Engineering firms in particular to a great extent still use less sophisticated CBT. Reasons behind this gap have not been identified by the academic world, which constitutes an academic problem.

Purpose

The purpose of this study is to investigate the underlying reasons to a potential theory-practice gap within the firms included in the study. The study is intended as a complement to previous research of an explanatory nature and as input to further research in the area where identified reasons can be useful.

Method

The study is of a qualitative nature as this approach is better suited for capturing the various complex reasons affecting the design of a capital budgeting process. The methodology components consist of a literature study, containing both corporate finance theory and previous research and an empirical study of four interviews. The firms are evaluated on four components, cost of capital, CBT, risk and project characteristics. Further, only tangible projects in the production process are considered due to research quality reasons. The interviewed firms are all part of the Industrial Engineering industry's sub-industry, the Industrial Machinery industry and listed on the Nasdaq OMX 30 index.

Results and study findings

The study has identified a theory-practice gap within the firms investigated. All firms employ a more or less fixed cost of capital for the firm, not reflecting the true cost of capital. In line with previous research, we find a great reliance on the payback-technique as an actual decision measure even though it is often combined with more sophisticated CBT. Risk is almost exclusively assessed qualitatively and only one firm incorporates risk in the CBT. Strategic value of a project affects the process as numerical criteria are lowered but is not valued using theoretical approaches. Flexibility is handled in a similar manner. We identify the main reason to the gap to be the priority of the capital budgeting process. Only limited evaluation and enhancements of the process are made which impedes firms to find all projects adding to firm value. The fundamental strategy of corporate finance theory that all projects with Net Present Value greater than zero should be undertaken seems to be overlooked.

Future areas of research

An obvious extension of this research would be to look at the investment process for all project types. Other possible future areas for research are similar studies in other industries in order to identify further reasons to a theory-practice gap. It is also of interest to perform research with a quantitative approach to investigate whether the findings can be generalized within the industry or country. Interesting research would also be to investigate the hypothetical relationship between reward systems based short-term profitability and capital budgeting practices.

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Table of Contents

1. INTRODUCTION

1.1 BACKGROUND	1
1.2 THE INDUSTRIAL ENGINEERING INDUSTRY	2
1.3 PROBLEM DISCUSSION	3
1.4 PURPOSE	7
1.5 STUDY CONTRIBUTIONS	7

2. METHOD

2.1 RESEARCH APPROACH	8
2.2 ANALYSIS MODEL	8
2.3 EMPIRICAL STUDY	10
2.3.1 CHOICE OF METHOD	10
2.3.2 CHOICE OF FIRMS AND INTERVIEWEES	10
2.3.3 INTERVIEW DESIGN	11
2.4 LITERATURE STUDY	12
2.4.1 THEORETICAL FRAMEWORK STUDY	12
2.4.2 PREVIOUS RESEARCH STUDY	12
2.5 STUDY QUALITY CONSIDERATIONS	13

3. THEORETICAL FRAMEWORK

3.1 THE COST OF CAPITAL	14
3.2 CAPITAL BUDGETING TECHNIQUES	15
3.2.1 CBT WITHOUT UNCERTAINTY	15
3.2.1.1 Payback	15
3.2.1.2 Accounting rate of return	15
3.2.1.3 Net present value	15
3.2.1.4 Internal rate of return	16
3.2.2 COMPARING CAPITAL BUDGETING TECHNIQUES	16
3.2.3 ECONOMIC VALUE ADDED	16
3.3 RISK	17
3.3.2 PROJECT RISK	17
3.3.3 SENSITIVITY, BREAK-EVEN AND SCENARIO ANALYSIS	18
3.3.4 MONTE CARLO SIMULATION	18
3.3.5 CERTAINTY EQUIVALENTS	18
3.3.6 INTERNATIONAL PROJECTS	19
3.5 PROJECT CHARACTERISTICS	19
3.5.1 STRATEGIC VALUE AND POST-EVALUATION	19
3.5.2 FLEXIBILITY	20

4. EMPIRICAL FINDINGS

4.1 COST OF CAPITAL	21
4.1.1 FIRM A	21
4.1.2 FIRM B	21
4.1.3 FIRM C	22
4.1.4 FIRM D	22
4.2 CAPITAL BUDGETING TECHNIQUES	22
4.2.1 FIRM A	22
4.2.2 FIRM B	23
4.2.3 FIRM C	23
4.2.4 FIRM D	24
4.3 RISK	24
4.3.1 FIRM A	24

4.3.2 FIRM B	25
4.3.3 FIRM C	25
4.3.4 FIRM D	25
4.4 PROJECT CHARACTERISTICS.....	25
4.4.1 FIRM A	25
4.4.2 FIRM B	26
4.4.3 FIRM C	26
4.4.4 FIRM D	26
5. ANALYSIS	
5.1 COST OF CAPITAL.....	27
5.1.1 FIRM A	27
5.1.2 FIRM B	27
5.1.3 FIRM C	27
5.1.4 FIRM D	27
5.2 CAPITAL BUDGETING TECHNIQUES.....	28
5.2.1 FIRM A	28
5.2.2 FIRM B	28
5.2.3 FIRM C	28
5.2.4 FIRM D	29
5.3 RISK.....	29
5.3.1 FIRM A	29
5.3.2 FIRM B	29
5.3.3 FIRM C	29
5.3.4 FIRM D	30
5.4 PROJECT CHARACTERISTICS.....	30
5.4.1 FIRM A	30
5.4.2 FIRM B	30
5.4.3 FIRM C	30
5.4.4 FIRM D	31
5.5 APPLYING THE ANALYSIS.....	31
6. STUDY FINDINGS	
6.1 COST OF CAPITAL.....	33
6.2 CAPITAL BUDGETING TECHNIQUES.....	33
6.3 RISK.....	34
6.4 PROJECT CHARACTERISTICS.....	34
6.5 REASONS BEHIND THE THEORY-PRACTICE GAP.....	34
6.6 AREAS FOR FUTURE RESEARCH.....	35
7. BIBLIOGRAPHY	
7.1 WRITTEN SOURCES	37
7.2 INTERVIEWEES.....	38
7.3 E-MAIL CORRESPONDENCE.....	38
7.4 ELECTRONIC SOURCES.....	38
8. APPENDIX	
8.1 INTERVIEW OUTLINE	39

1. Introduction

In this thesis we investigate the potential theory-practice gap within the investment decision processes of firms in the Swedish Industrial Machinery industry. The following chapter will introduce the reader to the concepts investment, valuation and capital budgeting. Further, we provide a background and motivation to the choice of industry for the study and discuss the academic problem with regard to previous research as we establish the purpose of the study and relevant research questions.

1.1 Background

The Swedish encyclopedia defines investment as the placement of capital and in a broader context the sacrifice one makes for future income or other gain. In one of Oscar Wilde's comedy plays *Lady Windermere's Fan*, he describes a cynic as one who knows the price of everything and the value of nothing. Damodaran (2002) uses this description of a cynic to illustrate the assumption made by investors, that there is always a bigger fool. In other words the true value is irrelevant as long as there is a bigger fool willing to pay more for your investment. This argument could be justified if the investment was a collector's item or a painting. However, there should not be emotional or esthetical reasons behind investment decisions but expectation about future cash flows that the investment will bring (Damodaran, 2002).

In order to estimate the value of something one must first define value. In corporate finance theory, a widely accepted definition of the main goal of a firm is to maximize shareholders' wealth, in other words to maximize firm value (Copeland et al., 2005). Cohen and Yagil (2007) identify three policies corporate managers must optimize to maximize firm value. These are 1) investment, 2) financing and 3) dividend policies. Investment policy is defined as: *"both the amount and type of growth pursued and projects undertaken"* (Cohen and Yagil, 2007, p. 57). Out of these three, investment policy is according to Cohen and Yagil (2007) the most important. They state that; *"Theory predicts that corporate managers would consider investment policy the most important policy, because it forms the basis of the firm's business operation and growth"* (Cohen & Yagil, 2007, p. 57). Many others have discussed the importance of investment policy; two of them are Arnold & Hatzopoulos (2000), who state the following in their article:

"The survival and vitality of a corporation are determined by its ability to regenerate itself through the allocation of capital to productive use. The selection and employment of processes and techniques to decide major financial commitments are crucial." (Arnold & Hatzopoulos, 2000, p.603)

So in order to survive, corporate managers must be able to correctly evaluate project opportunities. Firms must use tools to evaluate projects from a shareholder perspective. This dilemma creates a need for other techniques dealing with this issue. Corporate finance is the academic areas in which

investment decisions are processed. The specific area is defined as capital budgeting and refers to the process of evaluating investment opportunities to decide which to undertake in order to maximize shareholders' wealth (Damodaran, 2002). In Sweden, the academic world and universities adopted this literature in the eighties (Sandahl & Sjögren, 2005).

In theory, there are several methods or Capital Budgeting Techniques (CBT) that can be used in the pursuit of maximizing shareholders' wealth, such as the payback-technique, the accounting rate of return, the Net Present Value (NPV), the Internal Rate of Return (IRR) and real options analysis (Copeland et al., 2005). However, empirical studies have shown that shareholders value securities, i.e. shares, on a basis of the present value of the discounted cash flows that the security contributes to its owner. This means that maximization of shareholders' wealth is the same as maximizing the discounted cash flows of all projects undertaken by a firm. The preferable CBT is therefore the one that identifies the projects that maximize shareholders' wealth and only CBT that incorporates a discounting factor, so called sophisticated CBT, can therefore be preferable (Copeland et al., 2005).

1.2 The Industrial Engineering Industry

The Industrial Engineering industry consists of all firms processing and refining metals into products ranging from basic mass consumer goods to household durables and high technology industrial capital goods. Since the Industrial Engineering industry provides input for other industries it is of great importance to the Swedish economy. The industry can be divided into several sub-industries but the main two are the Industrial Machinery- and the Metal Product industry. (engineering industry NE)

In Sweden, during the late 19th- and beginning of 20th century, the so-called genius (authors' translation) Industrial Engineering firms were founded such as Separator (Alfa Laval), ASEA (later ABB) and SKF. These firms were based on Swedish innovations and differed from other companies as they specialized and became the first experts in the industry of its kind. They had a central part in the development of the Swedish economy during the following years and throughout the 20th century. (machinery industry NE)

The industrial engineering industry is today the backbone of the Swedish economy. Firms in this sector have an aggregated turnover of 900 billion SEK, employ around 345 000 people and stand for around 50 % of the total Swedish exports. These firms have traditionally been very dependent on exporting and have therefore gradually become more global. Strategic initiatives and projects, such as moving different production plants in order to compete in the more globalized industry have also been carried out. (Chamber of Commerce) Due to the historical influence of this sector and its importance over such a long period of time to the Swedish economy, it is interesting to investigate this industry and more specifically the role models of the industry, i.e. the largest firms. Moreover, investment

policies should be part of core operations due to the producing nature of the industry, which further suits this study.

1.3 Problem discussion

Researchers have since the latter part of the 2000th century increasingly supported sophisticated CBT. The theory-practice gap in firm's capital budgeting processes has been extensively researched over the years, primarily in international studies. Early research by for example Christy (1966) and Klammer (1972) describe a reality of sophisticated CBT becoming increasingly popular with time. Later research confirms this trend as Arnold & Hatzopoulos (2000) find, in a study of 96 UK firms, that sophisticated CBT has become widely spread. However, they conclude that the sophisticated CBT have not eliminated other, less sophisticated, CBT but added to the tools available for project valuation and projects are therefore valued using more CBT than previously. Graham & Harvey (2001), in their extensive study of 392 US Chief Financial Officers (CFOs), find that the use of sophisticated CBT has increased further and is the most frequently used CBT. In a multinational survey of 140 firms, Cohen & Yagil (2007) display a similar pattern as they find that sophisticated CBT are the most frequently used but also that the use of different CBT varies among countries.

This difference in practices between countries is shown in the Brounen et al. (2004) study of European firms. The study finds that sophisticated CBT is becoming widely spread but the most popular method for European firms is the less sophisticated payback-technique. Swedish research in the area consists primarily of the Sandahl & Sjögren (2005) study of large Swedish firms. The study verifies the findings of Brounen et al. (2004) concerning European firms as it finds that the payback-technique is the most frequently used in Swedish firms. Apparently there are differences in capital budgeting practices between countries and this makes research with the aim of defining factors contributing to this difference interesting. In order to investigate a theory-practice gap however, we must define the theory-preferred way of conducting capital budgeting, meaning to evaluate all projects undertaken by a firm using sophisticated CBT, where a discount factor is included (Sandahl & Sjögren, 2005). A relevant and necessary research question for this thesis is therefore; *What CBT do the firms use?*

In techniques using a discount factor, the marginal effect of each investment i.e. the project's contribution to firm value, should be determined by the discount rate (Sandahl & Sjögren, 2005). For projects with the same risk as the firm as a whole, the Weighted Average Cost of Capital (WACC) can be used as the discount rate to evaluate the investment opportunity as the WACC reflects the average cost of capital of the firm (Berk & DeMarzo, 2007). It is therefore seen as the academically preferred base-case cost of capital (Ryan & Ryan, 2002). The issue of how our firms estimate and use the WACC is therefore of great importance to this thesis. Many researchers have examined the cost of capital in large firms such as Oblack & Helm (1980), Jog & Srivastava (1995) and Ryan & Ryan (2002). Oblack and Helm (1980) find that 54 % of the multinational firms investigated use a WACC

for the firm. Jog & Srivastava (1995) find that 47 % of the Canadian firms investigated use a WACC and Ryan & Ryan (2002) conclude that 83.2% use a WACC. It is also interesting to investigate whether there are other measures used which would be in line with Oblack & Helm (1980), who find that several other measures were used for estimation of a firm's cost of capital, for example experience. The importance and understanding of the concept cost of capital is rudimentary in using CBT correctly and we therefore want to investigate how the firms in this study look upon this issue. Another relevant research question for this thesis is therefore; *How do the firms estimate the cost of capital used in their CBT?*

Theory states that if the project evaluated does not have the same risk as the firm, another discount factor than the WACC should be used. Using a discount rate higher than the appropriate one, which never can be known for certain, is likely to make firms pass on projects which would have been adding to shareholders' wealth. On the contrary, using a lower discount rate is likely to make firms take on projects that decrease shareholders' wealth. The discount rate is the theory-supported way of managing the marginal effect of a project, i.e. the project-specific risk, firms must also use CBT that incorporate a discount factor in order to be in line with theory. Smith (1994) identifies two main groups of measures for dealing with risk in general, intuitive- and analytical methods. Intuitive methods include subjective/qualitative analysis, risk-adjusted paybacks, discount rates or cash flows. Analytical methods include certainty equivalents, probability distributions, sensitivity analysis, simulations and decision tree analysis (Smith 1994). As Smith's framework implies, there are several ways to manage project-specific risk in a capital budgeting process. In line with this, Bruner et al. (1998) find that only 26 % of the surveyed firms always adjust their discount rate to incorporate project-specific risk. Sandahl and Sjögren (2005) find that 45 % of the largest Swedish firms incorporate risk in the WACC of the firm while only 30 % adjust the discount rate for project-specific risk, size or nature.

When facing project investment decisions, there will always be projects of different nature. One example of this is found in research by Bruner et al. (1998) who find that firms and financial advisors tend to use risk-adjusted discount rates only when traded financial assets comparable to the cash flows (projects) being analyzed can be found together with financial data of these assets. For example, debt markets provide data for risk in leasing cash flow. Managers seem to need benchmarks provided by financial markets in order to follow theory and risk-adjust the discount rates, which affects managers to use other CBT combined with other risk analysis methods if these benchmarks cannot be found. Risk assessors lacking the comparable financial assets described by Bruner et al. (1998) must therefore, if they want to follow theory, to a great extent qualitatively incorporate risk in the discount factor to reflect the increased or decreased risk of the investment compared to the WACC of the firm.

This poses the research question; *what risk analysis methods do the firms use and how do they incorporate project-specific risk in their capital budgeting process?*

Barwise et al. (1989) discuss the importance of strategy and that proper investment decisions should incorporate the project's strategic value. However, if managers argue that a project has other values that cannot be justified by CBT one should think twice. There should not be a gap between strategic- and financial decisions, in those cases the valuation is flawed. According to Barwise et al. (1989, abstract): *"Projects with a positive NPV will provide some form of competitive advantage"*. Hodder and Rigs (1985) discuss other criticism put forward by managers on sophisticated CBT. The authors clarify that the techniques are essentially tools and if correctly used they give a logic estimate of the value of the investment. Not looking at the output from these tools solely as fixed outputs and trying to understand the underlying reasons for the project's profitability is fundamental for a good estimate.

"Managers can not treat a DCF evaluation like a black box, looking only at the output. They need to break open the box, examine how those assumptions affect the analysis of a project's long term profitability." (Hodder and Rigs, 1985, p.135)

A widely discussed potential characteristic of a project that should affect the capital budgeting process is flexibility. According to Clas Wihlborg (2002), a project can be said to have real options (flexibility) when a project has the same characteristics as a financial option. Dixit and Pindyck (1994) discuss a simple example of an option to deferral and show the value of such an option compared to the NPV-technique. Clas Wihlborg (2002) discusses the value of incorporating flexibility further and exemplifies several different real options such as expansion, abandonment and learning. Using these examples combined with a deeper discussion on the subject, Clas Wihlborg (2002) outlines the importance of identifying options in order to narrow the gap between capital budgeting and the strategic incentives pursued by a firm. Sandahl and Sjögren (2005) find that none of the surveyed firms use ROA in order to value flexibility, however, one third of the firms used some form of estimation or simulation in order to value flexibility.

The difference in project characteristics can, as described above, imply use of different capital budgeting processes but can also change where in the organization investment decisions are made. Characteristics such as size, length or strategic value are possible important factors when determining where in an organization to decide on whether to undertake a project or not. On another project characteristic topic Brealey et al. (2008) discuss issues such as reward-systems for successful projects as well as the use of post-analysis processes contributing to continuous improvement of the capital budgeting process. Another example of how characteristics of a project affect capital budgeting processes is shown by Ross (1986) who finds, in an in-depth study of eleven firms, that small projects are valued using severely simplified sophisticated CBT or less sophisticated CBT than used to

evaluate larger projects. Due to the aspects discussed above it is of interest to investigate whether the firms incorporate other aspects than just the numerical output given by the CBT, into their capital budgeting processes. Keeping in mind that theory supports the evaluation of all projects using sophisticated methods, a research question that we will use for the reasons discussed above is; *What project characteristics affect the capital budgeting process?*

Relatively little research concerning the underlying reasons for the theory-practice gap in capital budgeting has been conducted, maybe because it requires a more qualitative approach and access to firms' top financial managers. Performing this study also puts focus on the delicate issue of confronting managers with flaws within their firms' capital budgeting process, which further displays the barriers of a qualitative study like this but also legitimizes such a study. However, research as to why theory and practice differ has put some hypothetical reasons forward. The two main reasons that have been put forward by researchers over the years are that the theory-practice gap exists because of lack of knowledge concerning capital budgeting theory and that the techniques themselves are hard to apply in a complex reality (Sandahl & Sjögren, 2005). Additional reasons that have been put forward are for example size (Graham & Harvey 2001), tradition within the firm/industry (Sandahl & Sjögren, 2005) and age of top management and academic background (Graham & Harvey, 2001). Arnold & Hatzopoulos (2000) state in their recommendations for further research that:

"An obvious extension of this research would be an in-depth study of the capital investment practices employed by individual corporations. This will provide a better understanding of the entire process. In particular, the qualitative factors influencing capital investment decision-making can be examined."
(Arnold & Hatzopoulos, 2000, p.623)

Regarding the Swedish Industrial Engineering industry, which is the aim of this study, Sandahl & Sjögren (2005) find that the industry has the highest amount of users of the less sophisticated payback-technique out of the industries surveyed (92.9%). This finding is of great interest to us due to the earlier description of this particular industry's historical importance and present contribution to Sweden's economy. The firms in our study are also among the largest firms in Sweden and should therefore, according to previous international research, use sophisticated CBT to a higher degree than smaller firms. In contrast to this however, Sandahl & Sjögren (2005) find that the use of the payback-technique is not dependent on the size of a firm.

As described in this discussion, previous research is unanimous when concluding that far from all firms use a theoretical preferred capital budgeting process. Hypotheses have been put forward such as lack of knowledge and problems of applying sophisticated CBT in a complex reality but, however, none have been confirmed. The question of why certain capital budgeting processes are used is

therefore of great importance to this thesis as we, as a complement to previous research, namely Sandahl & Sjögren (2005), want to investigate the issue of capital budgeting on a deeper level to find underlying reasons to the current capital budgeting practices. Moreover, the previous research within the area has in common that it investigates primarily which capital budgeting processes firms use from a yes/no perspective. This limits the amount of information that can be concluded about the actual, possibly complex, capital budgeting processes in the firms. This leads us to the main question of our thesis which is; *Why do the firms use the capital budgeting process found in the empirical study?*

With the discussion in this section in mind, we feel intrigued to investigate how and why the Swedish Industrial Engineering firms, included in this study, design their capital budgeting process the way they do. There is an apparent need for a study on a deeper level within the area, which we feel that we can satisfy. In order to fulfill our purpose we will answer the questions formulated in the problem discussion. The four sub-questions will help us answer the first part of the purpose; how the firms design their capital budgeting process and the main research question will answer the second part of the purpose; the reasons behind the processes found.

- *What CBT do the firms use?*
 - *How do the firms estimate the cost of capital used in their CBT?*
 - *What risk analysis methods do the firms use and how do they incorporate project-specific risk in their capital budgeting process?*
 - *What project characteristics affect the capital budgeting process?*
- *Why do the firms use the capital budgeting process found in the empirical study?*

1.4 Purpose

Building on the discussion in the previous section, the purpose of this thesis is stated as follows:

To investigate how large Swedish Industrial Engineering firms design their capital budgeting process and reasons behind a potential theory-practice gap?

1.5 Study contributions

The targeted audience of this thesis is researchers and professionals active in the field of capital budgeting, facing issues concerning investment decisions on a regular basis. Whether the issue at hand is what to educate students or how to design a firm's capital budgeting process our hope and belief is that this thesis will provide input and thoughts on aspects that should be considered. Focus is put on reasons as to why theory and practice differ as we try to identify areas and situations where theory is hard to apply as well as areas where theory should be applied by firms. This thesis is therefore a complement to previous research and a contribution to the academic world of an explanatory nature, in order for it to gain a broader understanding of various issues affecting the implementation of theory in reality.

2. Method

The method section of this thesis is a description of the actions we will take and tools we will use in order to fulfill the purpose of the thesis. The most important part of our method is the analysis model, which is the tool we will use to convert empirical data and theoretical input into results and conclusions. The chosen method for the empirical study has to be able to feed empirical findings into the analysis model. In this chapter we therefore outline an analysis model capable of assisting us in turning empirical data and theoretical input into results and conclusions. We also discuss our choice of method for the empirical study and incorporate a discussion concerning the literature study.

2.1 Research approach

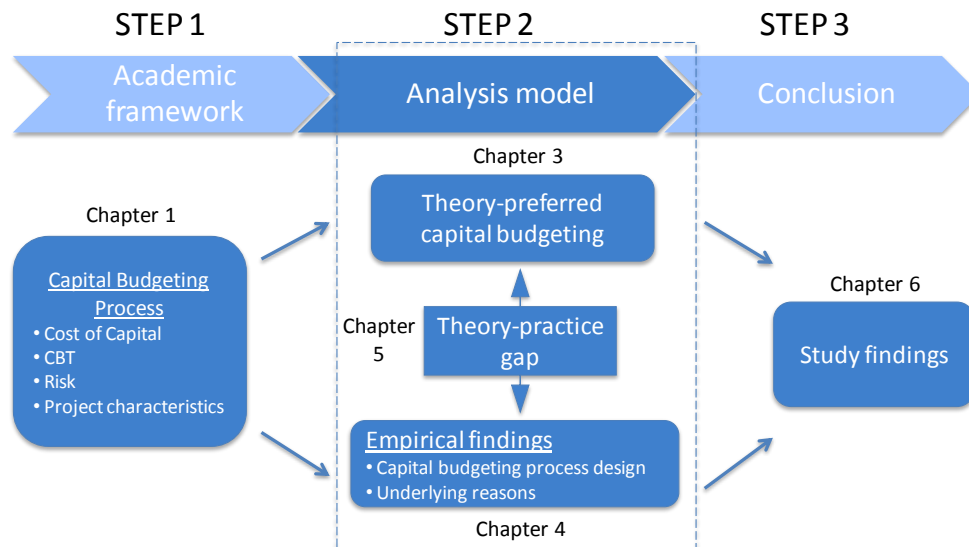
As the problem identified in the previous chapter is of an explanatory nature, meaning that this study will try to answer why things are as they are, we will need to use a qualitative approach in our research (Bryman, 2001). The qualitative approach enables us to generate findings of explanatory nature, further described in subsequent sections. A central part of this study is also to examine a potential theory-practice gap, which forces us to use both a theoretical- and an empirical approach in our research. The theoretical framework is to be used as a tool for analysis of the gathered empirical data as described in the next section. We will therefore use the deductive approach concerning the relationship between theory and research as we start in theory and then approach the real world in gathering the empirical data.

There is no widely accepted theoretical definition of different types of projects and therefore we decided to specify our own definition in order to reduce this pitfall in our deductive approach. Dayananda et al. (2002) have discussed this issue and divide projects into intangible and tangible. Since the Industrial Engineering industry's core activity can arguably be defined as producing goods to be used by other industries. The main areas for investment decisions, both in terms of importance and number of projects, should therefore be tangible projects such as new plants, facilities, machinery etc. Hence, we decided to investigate the academic problem by using projects of a tangible nature as reference projects. Moreover, we will not be able to generalize the findings of this study to a larger population but provide input for empirically testable hypotheses concerning reasons for a theory-practice gap.

2.2 Analysis model

Our analysis model can be seen as a framework for an analysis that will help us answer the research question and the sub-questions, enabling us to fulfill the purpose of the thesis. The model must include a framework where theory and practice can meet, as this is a thesis within theory-practice gap in the capital budgeting area. In qualitative research like this, it is harder to construct an analysis model that by itself converts empirical data into results. The actual analysis has to, in the end, be made more or

less qualitatively by us, the authors. The analysis model we will use in this study is therefore a tool to structure empirical data and theoretical input in a way that enables a qualitative analysis to be performed and generate conclusions. An overview of the whole method for this thesis with the analysis model as the second step can be illustrated in a schematic way as below:



As displayed in the figure we start in step one in which the academic framework is introduced to the reader using previous research describing each of the four themes that will be analyzed. Moving along to step two, the analysis model, we start in chapter three by describing the theory-preferred capital budgeting which has to be defined in order to succeed in our analysis. Establishing a definition of theory-preferred capital budgeting will enable us to compare this with the empirical findings, which we present in chapter four, and help us identify the potential theory-practice gap in chapter five. Finally, in the third step, we discuss our findings and compare them to the academic framework we introduced in step one.

The most important feature of the analysis model is that this, less structured analysis model, allows us to incorporate all possibly diverse reasons behind a certain capital budgeting process. As there is limited previous research as to why a theory-practice gap in capital budgeting can exist in firms in general, a more rigid and pre-formulated analysis model is of no interest due to the lack expectations on the empirical findings. Flexibility within the study is one of the greatest benefits of conducting a qualitative study and the analysis model must therefore also reflect and incorporate flexibility in order to be useful. However, similar to the theory-preferred capital budgeting component of the analysis model, empirical findings will also be evaluated on the four components of the theoretical framework. In this component we also add the issue of the underlying reasons to why firms use the capital budgeting processes found in the empirical study, which is the core and main contribution of this thesis. We are confident that this model will give us a broader and deeper understanding of the “how” factors, meaning how the capital budgeting processes are actually designed and allows us to understand the “why” factors of such a process.

2.3 Empirical study

2.3.1 Choice of method

When making a choice of method for the empirical study we have to consider some guidelines put forward by literature in the area of scientific research methods. Esaiasson et al. (2004) identify cases where qualitative research is a better fit to test theory than quantitative research. Qualitative research is suitable when the research involves complicated topics where the researchers want to investigate how the respondents think or the way they act and go beyond the pre-fabricated answers, often present in a quantitative method. Another case where qualitative research can be successfully applied is in cases where the research is meant as a complement to other research (Esaiasson et al., 2004). These two areas fit our purpose well as we want to investigate how the capital budgeting processes are designed but more explicitly the underlying reasons to explain a possible theory-practice gap rather than just stating the how factors. We mention in the problem discussion that the latter is examined in previous research by for example Sandahl & Sjögren (2005) and our research can therefore be seen as a complement to previous research within the area.

We do not feel that the complexity of the topic can be properly examined using a survey method and as said, our aim is to go deeper into the capital budgeting process than previous research has done. This is why we have decided to conduct interviews as our method for the empirical study. The qualitative method gives us flexibility in the empirical study process to capture important issues identified during the process. Another factor supporting our decision is the issue of getting a good response-ratio with the limited time given for the study and our status as students. However, we should in this section highlight that our method for the empirical study will not be strictly qualitative, as we will have to use similar questions in the interviews in order to be able to answer the theory-practice gap aspect of the research questions. Esaiasson et al. (2004) also identify that there are no or few studies that are strictly qualitative or quantitative but most have elements of both in them.

2.3.2 Choice of firms and interviewees

As stated in the problem discussion, the targeted firms of this study are large Swedish Industrial Engineering firms due to the findings of previous research of low reliance on sophisticated CBT and the industry's production orientation. Consequently, we include four large firms in the sub-industry, Industrial Machinery, as the subjects of our empirical study. The four firms are the only Industrial Machinery firms listed on the Nasdaq OMX 30 stock index according to the classification system, GICS, used by Nasdaq OMX and therefore fit the description of large firms (Wäsström, 2011, April 15th). The firms are Alfa Laval, Atlas Copco, Sandvik and SKF. The firms are of great importance to the index but also to the economic environment in Sweden as they employ a significant amount of people and contribute considerably to Sweden's export and GNP. Including these four firms in our study suits our time constraints well and means that we incorporate all firms within the small population, *large Industrial Machinery firms*. The firms also represent the Swedish Industrial

Engineering industry well as they are among the largest and arguably are able to influence smaller firms regarding the capital budgeting process.

The sampling of interviewees was done in a form similar to what often is referred to as “snowball sampling”, where an employee of a firm was contacted and then asked to redirect us to the person with the right competence for our area of research (Bryman, 2001). This method enabled us to find the professionals most suitable for our study. The contact was in most cases carried out by telephone in order to secure the right competence and thereby a viable empirical study, before conducting the interview. In cases where the professional was hard to reach by telephone, the right competence was secured by email.

The interviewees received all have in common that they are in senior positions within the firms’ finance departments. Their positions are; Vice President Group Controlling, Head of Group Business Control, Vice President Operations, Business Control and Chief Financial Officer. Due to their positions, they are faced with decisions concerning capital budgeting on a daily basis and most importantly well familiar with the capital budgeting process in the firm.

2.3.3 Interview design

The interviews will be conducted in a semi-structured manner, which is a structure of conducting empirical studies through interviews within the qualitative research area (Bryman, 2001). The semi-structured manner is preferable since we want to be able to compare answers to key questions. This will enable us to better use our analysis model and make conclusions from the empirical material as we can secure that all vital areas are covered, namely the four components discussed in the theoretical background. Further, this design allows us to follow up on interview-specific topics that might differ from interview to interview and create a better understanding of reasons behind a certain capital budgeting process, i.e. the purpose of this thesis.

In designing our interviews we will consider and make a distinction between thematic– and dynamic questions as defined by Esaiasson et al. (2004). The thematic questions aim to focus the interviews on the area of research and the key questions used for comparison between the firms. The dynamic questions are not strictly formulated but rather questions formulated during the interview that are meant to, as the name implies, create a dynamic and appealing discussion for both parts and motivate the interviewees to share as much relevant information as possible (Esaiasson et al., 2004)

The interviews are to be held at the work place of the interviewee, this is more convenient for the interviewees and increases our chances of obtaining the sought after interviewees. This setting also provides a safe and familiar environment for the interviewee, which is an aspect supported by Esaiasson et al. (2004) amongst others. Moreover, the interviewees are to be pushed into answering

the formulated, thematic questions which are crucial for this thesis but also as our status as students might influence interviewees to give less extensive answers, also known as interviewer-influence. We regard the value of having personal interviews highly as this enables the researcher to assess body language and other subtle aspects in order to decide on the right follow-up questions (Esaiasson et al. 2004).

2.4 Literature study

2.4.1 Theoretical framework study

The theoretical framework section gives the reader the necessary understanding of key methods/techniques and expressions in the capital budgeting area and lead to an understanding of what is considered theory-preferred capital budgeting. This is vital since this thesis focuses on the possible theory-practice gap and the underlying reasons behind it. The theory-preferred capital budgeting is also, as stated, a vital part of the defined analysis model.

In order to define a theoretical framework for this thesis we mainly use textbooks based on acknowledged and peer-reviewed research. The textbooks used are mainly the ones by Copeland et al. (2005), Berk & DeMarzo (2007), Brealey et al. (2008) and Damodaran (2002). These textbooks can be seen as summaries of relevant literature in the area and are therefore good in the process of defining a theoretical framework. Additional literature is used when topics arise in the theoretical framework section that the summarizing textbooks do not cover.

2.4.2 Previous research study

Previous research within capital budgeting is important for this thesis, as this is where we find the gap in previous research that we will try to fill by answering our main research question. Previous research also tells us what to look for and expect in our empirical study as a comparison between this study and previous studies are of interest even though this thesis differs in the way that it focuses on the reasons behind capital budgeting processes in a qualitative manner. The applicability of previous research as to what underlying reasons exists is however limited and often stated in hypothetical terms.

The study of previous research is conducted in what Esaiasson et al. (2004) define as a qualitative manner, meaning that the previous research is analyzed with selectivity, i.e. a democratic method is not the primary focus and sections not important for this thesis are disregarded in the analysis. Moreover, the study is undertaken in order to logically systemize rather than criticize previous research since we need an overview of previous research in order to locate the areas for our research problem.

The previous research study has been conducted electronically to a great extent, through data-bases provided by the Gothenburg university libraries. Data-bases used are mainly Business Source Premier,

Business Source Elite, Emerald Management. Key words in our search process are; capital budgeting, capital budgeting process, theory-practice gap, risk, flexibility, investment and cost of capital. Printed sources consist of relevant literature referred to by previous researchers, which are not available electronically and therefore found at libraries in the Gothenburg area.

2.5 Study quality considerations

When considering the quality of academic research, measures like reliability and validity are often used as assessment tools. Reliability refers to the extent to which a study can be reproduced with the same results and because of that also assesses the tools used in a study. It is often associated with quantitative research as qualitative aspects of a subject often differ widely between different sources (Bryman, 2001). We will therefore not discuss the reliability aspect further in this discussion of quality measures. Validity refers to whether a study investigates what it is supposed to investigate and can be further divided into internal- and external validity.

Internal validity focuses on whether conclusions from the study are trustworthy or not. For qualitative research the issue of internal validity is often less eminent as a lot of time and effort is spent on the sources of information. This enables the researcher to verify and secure the information obtained, resulting in high internal validity (Bryman, 2001). In this study we have also tried to outline the interviews in ways enabling us to verify and secure the information given to us. The fact that we limit the study to investment processes concerning tangible projects also improves the internal validity.

External validity refers to the extent to which a study's findings can be generalized to other situations or samples. This is often a problem for qualitative research as it is frequently based on case studies or small samples, which makes it hard to apply findings to other populations (Bryman, 2001). In this study, due to the scope of this thesis, to investigate large Swedish firms in the Industrial Machinery industry, we have obtained interviews with all firms in the small population. However, Generalizing the results of our study is not the primary contribution of the study as generalizing in this small population would be of little interest. Emphasis is put on how the capital budgeting processes are designed and on identifying reasons behind them in order to improve the research within the theory-practice gap in capital budgeting. These reasons can then be tested empirically on other firms or industries contributing to a better understanding of impediments or opportunities in implementing theory in capital budgeting processes. An aspect promoting higher external validity is, however, that the firms included in the study are industry leaders and can therefore arguably be seen as role models for the industry as a whole, influencing their design of the capital budgeting process.

3. Theoretical framework

In this section we present the reader with a description of the theories behind good capital budgeting. Issues covered are the cost of capital, CBT available for decision-making, risk and project characteristics. This is important since we will use this framework throughout the whole thesis, as a framework for analysis. We identify the theory-preferred way of conducting capital budgeting and areas where theory-practice gaps may arise. As a framework for analysis, empirical findings will be analyzed in the light of this theoretical framework and interviews will be based on theory presented in this section.

3.1 The Cost of Capital

To understand sophisticated CBT one must first know the concept behind a firm's cost of capital, most spoken in terms of the Weighted Average Cost of Capital (WACC). The funds of a firm are attributed by creditors and shareholders, which provide debt and equity respectively. These investors require a rate of return on their investment compensating for the risk of placing their capital in the firm. This means that the firm must be able to pay interest on debt to creditors and dividends to shareholders. When the firm invests in a project, its expected cash flows must be enough to fulfill the required rate of return from its investors. Therefore, sophisticated CBT discount cash flows at the WACC since only if these cash flows create a rate of return exceeding the WACC, the project increases shareholders' wealth. (Copeland et al. 2005) Mathematically the WACC is computed as follows:

$$WACC = K_b(1 - T_c) \frac{B}{B + S} + K_s \frac{S}{B + S}$$

K_b is the cost of debt, T_c the corporate tax rate, B the market value of debt, S the market value of equity and K_s the cost of equity (Copeland et al. 2005).

Damodaran (2002) discusses the components of the WACC in depth and identifies the appropriate techniques for estimating these. The cost of debt should be the market rate at which the firm can borrow, adjusted for any tax advantages of borrowing. The cost of preferred stock should be the preferred dividend yield and the cost of equity is defined as the return that investors require on an equity investment in the firm. To calculate the cost of equity, one needs to find the riskless rate of return, the premium or premiums (depending on technique for estimating cost of equity) and a measure of the firm's exposure to market risk (beta). The riskless rate of return is the expected return on an investment with no default risk and no reinvestment risk. The risk premium/s can be estimated by looking at past stock returns and government securities or by looking at how the market prices stocks currently. A firm's beta is best estimated by examining the betas of comparable firms within the business that the firm operates in rather than measuring it by a regression of returns on the firm's stock against returns on a market index. The two main theoretical models calculating cost of equity are the

Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Model (APM) or other multifactor models. (Damodaran, 2002) Mathematically:

$$\text{CAPM: } k_s = r_f + (r_m - r_f)\beta$$

Where the riskless rate (r_f) is the long-term government bond rate, the beta (β) would be the historical, fundamental or accounting betas and the risk premium ($r_m - r_f$) would be either the historical premium or implied premium (Damodaran, 2002).

$$\text{APM: } k_s = r_f + \sum_{j=1}^{j=n} (r_m - r_f)_j \times \beta_j$$

Where the riskless rate (r_f) is the long-term government bond rate; the Beta (β) is the beta relative to factor j , estimated using historical data or fundamentals and the risk premium ($r_m - r_f$) is the risk premium relative to factor j , estimated using historical data (Damodaran, 2002).

3.2 Capital Budgeting Techniques

3.2.1 CBT without uncertainty

In a world without uncertainty, i.e. if cash flows generated from a project are known for certain, Copeland et al. (2005) identify four widely used capital budgeting techniques. These are presented in this section.

3.2.1.1 Payback

The payback-technique refers to the time it takes to recover the initial cash outlay on a project (Copeland et al. 2005). A mathematical example follows:

Project	Initial outlay	Cash flow year 1	Cash flow year 2	Cash flow year 3	Pay back
A	-1000	0	0	1500	3
B	-1000	900	400	0	2
C	-1000	1000	100	-200	1

3.2.1.2 Accounting rate of return

The accounting rate of return (ARR), is the average after-tax profit divided by the initial cash outlay (Copeland et al. 2005). Mathematically:

$$\text{A: } \frac{\frac{-1000+0+0+1500}{4}}{1000} = 0.125 \quad \text{B: } \frac{\frac{-1000+900+400+0}{4}}{1000} = 0.075 \quad \text{C: } \frac{\frac{-1000+1000+100-200}{4}}{1000} = -0.025$$

Assuming that the figure in the table above (section 3.2.1.1) is accounting profits the ARR for each project are calculated.

3.2.1.3 Net present value

The net present value (NPV), will accept projects with an NPV greater than zero. NPV is computed by discounting the cash flows at the opportunity cost of capital for the firm (WACC) (Copeland et al. 2005). Mathematically:

$$NPV = -I_0 + \sum_{t=1}^N \frac{E(FCF_t)}{(1 + WACC)^t} > 0$$

FCF is the free cash flow from start to end of the project (time period t), I_0 is the initial cash outlay for the project, WACC is the weighted average cost of capital and N is the number of years of the project (Damodaran, 2002).

3.2.1.4 Internal rate of return

The Internal Rate of Return (IRR) is defined as “that rate which equates the present value of the cash outflows and inflows” (Copeland et al. 2005, p. 28). Mathematically:

$$NPV = 0 = -I_0 + \sum_{t=1}^N \frac{E(FCF_t)}{(1 + IRR)^t}$$

3.2.2 Comparing capital budgeting techniques

As previously stated, Copeland et al. (2005) identify the best capital budgeting technique as the one that maximizes shareholders’ wealth. To specify how this could be done, the authors have broken down the criterion into the following four criteria:

- All cash flows should be considered.
- The cash flows should be discounted at the opportunity cost of funds.
- The technique should select from a set of mutually exclusive projects the one that maximizes shareholders’ wealth.
- Managers should be able to consider one project independently from all others (known as the *value-additivity principle*).

Copeland et al. (2005) evaluate the four identified techniques with the four criteria and conclude that the payback-technique does not fulfill all criteria since it does not include all cash flows and fails to discount them. The accounting rate of return includes accounting profits, not cash flows and also fails to discount them. The IRR does include all cash flows but fails to obey the other three. The NPV on the other hand fulfills all four identified criteria. It maximizes shareholders’ wealth and should therefore be used as a firm’s primary CBT if choosing from these four. (Copeland et al. 2005)

3.2.3 Economic Value Added

Another discounting CBT introduced in the 1990s by Stern Stewart, a New York-based consulting firm, is called Economic Value Added (EVA). This method has become very popular and imitated by many competitors to Stern Stewart. The model measures the dollar surplus value created by an investment. (Damodaran, 2002) Mathematically:

$$\begin{aligned} EVA &= (\text{Return on capital invested} - \text{Cost of capital}) * (\text{Capital invested}) \\ &= \text{After-tax operating income} - (\text{Cost of capital} * \text{Capital invested}) \end{aligned}$$

Damodaran (2002) linked the EVA to the NPV-technique and showed that, if the expected present value of the cash flows from depreciation is assumed to be equal to the present value of the remain of the capital invested in the project, the NPV of the project is the present value of the economic value added by that project over the project lifetime. Mathematically:

$$NPV = \sum_{t=1}^{t=n} \frac{EVA_t}{(1 + k_c)^t}$$

Where k_c is cost of capital invested

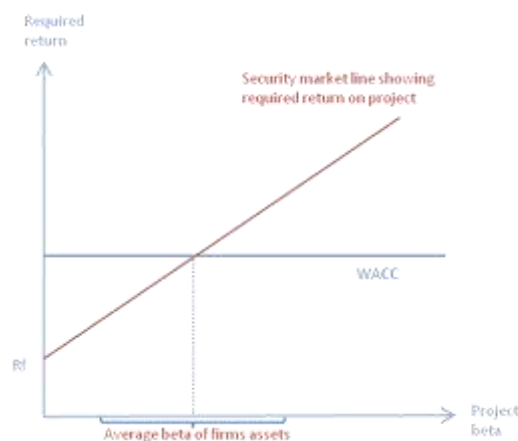
Damodaran (2002) discusses the weakness of EVA and defines three ways management can abuse the measure for their own good while destroying firm value. The simplicity of the model therefore comes at a cost. Managers can take advantage of measurement limitations, making their firm look better but essentially reduce the value of the firm. (Damodaran 2002)

3.3 Risk

Risk can be defined as the deviation in return from the return that we expected to get. It is the cash flows contributed by a project to the firm that are subject to risk as these cash flows are what create firm value. Numerous factors can affect the outcome of a project, it is therefore of interest to decision makers to incorporate risk in the capital budgeting process in order to minimize the amount of projects contributing negatively to firm value. (Damodaran, 2002)

3.3.2 Project risk

The true cost of capital for a project depends on the project risk. If the risk is the same as the firm's overall risk it is correct to use the WACC as the cost of capital for the project. Generally, most projects undertaken by a firm should have firm risk characteristics, as a firm's overall risk should be the average risk of all projects undertaken. However, if a project does not have these risk characteristics one should adjust the cost of capital for project-specific risk. (Brealey et al. 2008) To illustrate this Brealey et al. (2008) incorporate the WACC in a graph with required return versus the beta of a project.



Source: Brealey et al. (2008) p. 240

If a firm used the firm's cost of capital for every investment decision it would reject many good low-risk projects and accept many poor high-risk projects. Many firms therefore require different returns from different categories of investment and use a cost of capital for each investment. Brealey et al. (2008) exemplify this using the following categories and discount rates:

Category	Discount rate
Speculative ventures	30%
New products	20%
Expansion of existing business (Firm cost of capital)	15%
Cost improvement, known technology	10%

Source: Brealey et al. (2008) p. 240

When a firm is evaluating a project with different risk characteristics than the firm, Brealey et al. (2008) give three guidelines for evaluating project risk. First, they suggest that when estimating project betas one should avoid fudge factors. This means adjusting the cash flows i.e. forecasting the most accurate base-case to the risk characteristics before changing the discount factor. Managers should ask whether the chance of bad outcomes adds to the project's market risk. Secondly, a project beta can usually be estimated, even if it cannot be calculated directly, by analyzing how the cash flows are affected by the overall performance of the economy, cyclical investments are generally high-beta investments. Firms can also look at the project's operating leverage; fixed production charges work like fixed debt charges and that means that they increase beta. Thirdly, one should not increase the hurdle-rate to offset risk factors that can be diversified away in a stockholder's portfolios. (Brealey et al. 2008)

3.3.3 Sensitivity, Break-Even and Scenario analysis

One way to treat uncertainty is the sensitivity approach. The assessor then identifies factors that drive the cash flow for the project. The assessor then recalculates the NPV of the project with optimistic and pessimistic values of each variable to get a better understanding of the project's sensitivity to these factors. The sensitivity analysis often moves on to a Break-Even analysis, in which key variables are set to the values where NPV equals zero. This method enables managers to identify to what range key factors are able to drop at the most, still generating a positive outcome. When key variables are tested in these approaches one can incorporate an analysis in which different variables change at the same time, what theory calls a scenario analysis. (Brealey et al. 2008)

3.3.4 Monte Carlo simulation

Monte Carlo simulation is a way of conducting a scenario analysis considering all possible combinations. By giving probabilities to each variable that determines the cash flow of a project, the Monte Carlo simulation results in a distribution of cash flows by using thousands of random numbers for each variable. With these distributions at hand, managers can get a better picture of expected cash flows and project risk. (Brealey et al. 2008) For further reading on how to incorporate Monte Carlo simulation in practice we suggest reading Smith (1994).

3.3.5 Certainty equivalents

As mentioned, firms usually discount each cash flow from a project at the same discount rate and this assumption is generally reasonable. However, there are exceptions to this assumption. One way of approach such a problem is to break the project into segments and use a specific discount rate within

the segment. Another approach is to use certainty equivalents, which convert the expected cash flows to certainty equivalents. This allows separate risk adjustments to each period's cash flow. (Brealey et al. 2008) How the discounted cash flow method is correlated with the certainty equivalent method can also be described in the figure below:



Source: Brealey et al. (2008) p. 252

3.3.6 International projects

The cost of capital should depend on market risk, meaning that if the firm's investors held the world market portfolio it would not matter if projects were carried out internationally or domestically because the beta measures risk relative to the investor's portfolio. However, empirical research has shown that investors in USA tend to be biased towards the domestic market. If this is the case, the risk of a project should be measured relative to its domestic market. So even if the standard deviation of international markets is higher than the domestic, it does not indicate that the project risk is higher since the beta is dependent on the correlation between these two markets' standard deviation. (Brealey et al., 2008)

3.5 Project characteristics

3.5.1 Strategic value and post-evaluation

Naturally, there is no one-way theoretical approach to how a capital budgeting process should be designed. This chapter identifies the theoretical approach to each component of capital budgeting but not explicitly how the overall process should be designed. The fact that managers are shareholders' agents and should actively work for finding projects that create shareholder value implies that the process should be designed to maximize this goal. In order to fulfill this goal, an understanding of the theoretical framework is fundamental but other factors may also be of importance. On this subject, Brealey et al. (2008) discuss the investment decision in context of the overall corporate strategy. In order to make good investment decisions, i.e. not overstate the cash flow or underestimate the risk of a project, firms must be able to understand the firm's competitive advantage, overall situation and identify the source of economic rents (profits that more than cover cost of capital). To successfully incorporate this issue and be able to value projects by their strategic importance, Brealey et al. 2008 discuss the need for some sort of reward for a successfully managed project. This requires a performance measure of some kind and preferably a follow-up process to each project in order to learn

from mistakes and continuously improve the capital budgeting process in line with the firm's strategy. (Brealey et al. 2008)

3.5.2 Flexibility

An important project characteristic is flexibility. As there is uncertainty in the real world and when looking upon multi-period investment decisions within capital budgeting, Copeland et al. (2005) come to another conclusion. By comparing the traditional NPV-technique with decision trees and real options analysis (ROA), researchers have been able to show the value of flexibility when faced with uncertainty. The traditional NPV-technique assumes no flexibility and therefore decision trees and ROA are more realistic as it is a more complicated model of reality. In line with Copeland et al. (2005), many publications have been made regarding the value of flexibility. For example, Damodaran (2002) states that:

“Perhaps the most significant and revolutionary development in valuation is the acceptance, at least in some cases, that the value of an asset may be greater than the present value of expected cash flows if the cash flows are contingent on the occurrence or non-occurrence of an event.” (Damodaran, 2002, p. 22)

When investing in a project, managers might expand the project due to success or abandon it due to poor returns. Decision trees and ROA identify factors that could affect the project and the main actions available. Then, by counting backwards from the forecasted future values to the present, it allows decision-makers to consider actions that should be taken in each case. Managers should be aware of this and in cases when projects show characteristics of flexibility, ROA can show the value due to the real options available, compared to if evaluated with traditional CBT. Often the real options that come with a project are key value drivers in an investment decision and are therefore important to take into consideration when evaluating projects with flexibility characteristics. (Brealey et al. 2008) For further readings about ROA we suggest Trigeorgis (1996) and for decision tree analysis, Dixit & Pindyck (1994).

4. Empirical findings

This chapter handles the core of this thesis, the empirical findings contributed by the firms included in the study. Results from the conducted interviews are categorized in a thematic manner according to the four areas for analysis included in the analysis model, cost of capital, CBT, risk and project characteristics. Results are further assigned to each firm as this enables us to draw attention to relationships and factors affecting the capital budgeting process design of a specific firm. The findings at each firm are presented anonymously as this is a wish of more than one firm. This chapter contains only data obtained during the empirical study and includes no contribution from the authors and all citations are translations conducted by the authors.

4.1 Cost of capital

4.1.1 Firm A

Firm A uses a different cost of capital for every country that the firm operates in and the cost of capital is obtained by simply adding 6 % to the interest rate set by the country's central bank. The cost of capital of the firm is re-evaluated continuously but the 6 % has been constant over a very long period (approximately 10 years). It is meant to include all components of the firm's cost of capital other than the country-specific interest rate. The 6 % were originally calculated using "sophisticated methods" as stated by the interviewee and has since then been constant. No further comments were given on what "sophisticated methods" were used at the time of estimation other than capital structure being one component.

The interviewee argues that the firm's operational cost of capital is the same no matter the geographic area where the project is carried out. The only variable in the calculation of the cost of capital for operations in another country is therefore the interest rate of that country. On the issue of why the cost of capital has been constant over such a long period, the interviewee states that: "*Differences of 1 - 2 % in the cost of capital do not matter when running such a large organization*" and that: "*The discount factor is sufficiently correct*".

4.1.2 Firm B

Firm B uses a cost of capital for the entire firm, which is set at 10 %. The cost of capital is re-evaluated once a year but has been constant as long as the interviewee can remember. Historically, the theoretically correct cost of capital has fluctuated around 9 – 12 % but, as said, no adjustments have been made even at times of large fluctuations or macroeconomic distresses. The cost of capital is estimated using the CAPM-formula for the cost of equity, the average interest rate on the net debt, the 10-year interest rate on government bonds and a beta value based on the stock's performance against the market.

The interviewee states that the main reason for the use of the same cost of capital over such a long period is that it is used in a lot of financial ratios for performance measurement. Changing the cost of capital would therefore mean having to change the frame of reference of users of the financial ratios, which according to the interviewee is problematic.

4.1.3 Firm C

Firm C uses the same cost of capital for the entire firm and employs a type of target cost of capital, which is set at 8,5 %. The cost of capital was earlier re-evaluated annually but the strategy of having a target cost of capital makes this process more about controlling that the cost of capital is at a level accurate in a long-term perspective. The cost of capital was, at the time of estimation, estimated using their own formula for establishing the cost of equity where the long-term real interest rate, inflation and a risk-premium on equity capital are added together. A long-term average borrowing rate is used as the cost of debt. The two components are then weighted with the target capital structure of the firm. Fluctuations in the steering interest rate are not considered as focus is set on a long-term perspective.

The strategy of having a target cost of capital is new as of 2010 and was established after a decision by the board. Reasons behind this refer to the nature of the firm's projects which are of a longer nature and using a long-term cost of capital is therefore better suited for the firm. The interviewee states that: *"Our investments are not within a 1-year time frame but meant to give returns during a longer time period"*. He goes on to say that it is not meaningful to adjust the cost of capital a couple of decimals and the benefits of knowing the cost of capital for the foreseeable future are greater than knowing the most accurate cost of capital for the time being.

4.1.4 Firm D

The cost of capital depends on the country where the operations are carried out. The cost of capital is set at a rate of 6 % plus the steering interest rate of the country and is used throughout the entire organization, from investment valuation to accounting measures. The cost of capital is re-evaluated annually but only for fluctuations in the country's interest rate. In extreme cases, like the recent financial crisis, the cost of capital is adjusted more often but also in these cases only in the interest rate component. The 6 % are meant to incorporate all costs of the firm's capital other than the country-specific risk, which is measured by the interest rate component. The rate of 6 % was originally determined by top management in an undefined process and has not been adjusted for a long period of time (approx. 10 years). On the question of how the 6 % rate is determined the interviewee states: *"That is something that we have determined"*.

4.2 Capital Budgeting Techniques

4.2.1 Firm A

The CBT used are the payback-, the IRR- and a version of the EVA-technique referred to as TVA (Total Value Added). The TVA-technique is the operating profit of the firm minus the cost of capital.

All three techniques are used to evaluate every project in a standardized electronic template, which generates results according to each technique. Historically, the IRR-technique has been the first choice of CBT but as the firm has become more cash flow oriented, the interviewee identifies that the payback-technique is now the firm's first choice when evaluating a project. Regarding to what extent the other techniques are important in the process he states: *"If the payback is good, the other measures are in most cases good, explaining why we often stop at the payback measure"*.

The interviewee identifies several reasons behind the choice of CBT, one being that the main bulk of projects evaluated by the firm have a payback of a shorter nature of around 3-5 years and that discounting these cash flows does not affect the decisions on projects. Other reasons are that techniques must be understandable to the entire organization, displayed by the interviewee when he states: *"Techniques must be simple, otherwise there is no penetration of the technique and that is more important than the techniques being theoretically correct"*. Another reason brought up by the interviewee refers to the large amount of projects being undertaken by the firm in a given time period. The interviewee explains that all projects can be said to form a normal distribution where the return of projects under and over forecasted returns contribute to an average return in line with expectations. This lowers the need for accurate forecasts using more sophisticated CBT and makes the payback-technique adequate.

4.2.2 Firm B

A discounted payback technique has historically been the firm-praxis for project evaluation. However, management has recently put the IRR-technique forward as the first choice of CBT for projects having to pass through top management and board (>15 MSEK). It is the interviewee's opinion that the IRR-technique will be the firm's first choice of CBT in the future but that the discounted payback technique is the most commonly used technique currently. The discounted payback technique used by the firm identifies relevant cash flows of the project, discounted them at the firm's cost of capital, and subtracts these from the initial cash outlay.

Historical reasons and culture within the organization are what the interviewee identifies as the main reasons for the extensive use of the payback-technique. He also articulates his belief that exaggerated sophistication does not lead to better investment decisions. However, the interviewee is very critical of the payback-technique in particular as he states: *"I think payback is a worthless measure, I don't understand why one would ever use this measure for investment valuation"*.

4.2.3 Firm C

Two CBT are used in the capital budgeting process, the NPV- and the payback-technique. The two measures are well documented and provide a firm-praxis in conducting project valuations. Both techniques are used to the same extent and are weighted equally when evaluating a project. The

interviewee further identifies that both measures are needed and that they often are consistent with each other.

The payback-technique is useful to the firm as investments with a long payback period are seen as more risky in the global business world that the firm operates in. The interviewee also highlights the fact that the firm has a good cash situation and that it has been so for a long time, which enables them to undertake all projects they wish to. This results in limited competition between projects and a capital budgeting process less dependent on precise CBT.

4.2.4 Firm D

The firm uses a framework for project evaluation containing several CBT, namely the NPV-, the payback-technique and a home crafted technique called Cost/Benefit-ratio. The three techniques are assigned the same weights and are all documented in internal documents describing the process for project evaluation. However, the interviewee identifies the payback-technique as the CBT most communicated within the organization due to its simplicity. The C/B-ratio is calculated using the estimated benefits and costs of the project discounted at the firm's cost of capital. Benefits are then divided with costs and the measure is obtained.

The firm focuses on having well defined and implemented instructions for what CBT to use since the firm consists to a large degree of engineers, often with less knowledge of the theoretically correct techniques to use for project evaluation. He states: *"In an engineering firm like this, people can be very creative when evaluating a project"*. Another factor stressed by the interviewee is that the techniques must be simple enough for employees to focus on the judgment and assessments necessary in the process and not on technicalities within the CBT. This is displayed as he states: *"If techniques are too complicated, people will not understand and that is very dangerous"*.

4.3 Risk

4.3.1 Firm A

Risk is considered in the capital budgeting process on an operational level and one part of the standardized system that the firm uses when evaluating projects. Risk is considered qualitatively and incorporated in the estimated base-case cash flow. However, if a bigger risk is identified in the project it will not affect the base-case estimations but will be a question discussed if the base case still holds. The interviewee states: *"We don't quantify the risk for practical reasons"* and *"Some projects turn out well and some not, that's the way it is"*. When evaluating larger projects above 50 MSEK, there is a standardized scenario analysis used. The scenario-analysis looks at the whole project and identifies at best- and worst-case which is explained in a memo to the board of directors and reflects how good estimation the base case is.

4.3.2 Firm B

Risk analysis is up to the person in charge of each project. The firm has no standardized procedure to handle risk in specific projects but encourage decision-makers to look at uncertainties and by doing so get an understanding of the downside-risk. The risk analysis is consequently qualitatively evaluated by the person in charge and incorporated in the base-case cash flow estimation.

4.3.3 Firm C

Risk analysis is part of the standardized capital budgeting process and there are several risk factors that are evaluated by the person responsible for the project. The factors are country-, technology-, investment-, and product risk. The person in charge goes through the factors and incorporates them in the process by setting levels for the risk factor, each corresponding to an adjustment of the project's discount rate. The risk is then incorporated in the CBT by adjusting the discount rate, the lowest one being the firm's cost of capital. However, the interviewee identifies that most projects are within the firm's overall risk level and that adjustments are rare. Regarding the risk of projects with longer payback periods the interviewee states: *"Of course it depends on what kind of investment we are evaluating but we would like the payback not to be more than around three years. If the payback is ten years, who knows what will happen in the business environment during that time?"*.

4.3.4 Firm D

The firm has a standardized process when evaluating a project. In the Cost/Benefit analysis used by the firm, the possible risks and a worst-case scenario should be presented to the definitive decision-maker. The risk factors are consequently qualitatively estimated and incorporated in the worst-case scenario. On the issue of how to secure that a thorough risk analysis is conducted the interviewee states that: *"You wouldn't approach your boss without information backing up your arguments"* and *"It is not about more sophisticated methods, it is about knowing the details and knowing the case"*.

4.4 Project characteristics

4.4.1 Firm A

Projects are generally divided into expansion-, mandatory- and cost-saving projects for internal control purposes. The CBT used in project evaluation are consistent in all three categories but criteria of mandatory projects might be loosened. The forecasted costs of the project affects where investment decisions are made in the organization. Projects under 5 MSEK are handled on an operative level, projects up to 50 MSEK by an executive committee including firm management and CEO and projects over 50 MSEK by the board. The interviewee identifies a use of post-evaluation of projects in order to learn from undertaken projects. Regarding projects of greater strategic importance, such as investments in growth markets, the firm somewhat loosens the requirements in terms of financial metrics obtained using CBT. The firm looks upon flexibility qualitatively but is not quantified and incorporated in numerical measures. In cases where flexibility is a factor, the interviewee states: *"In those cases we are less strict and might accept a lower payback."*

4.4.2 Firm B

Projects are divided into cost-saving- and replacement investments and are evaluated using the same CBT. Projects under 15 MSEK are managed on a divisional level while the CEO processes larger projects. Projects over 50 MSEK are to be assessed by the board. Further, no standardized post-evaluation of projects is communicated in the firm but is up to the project manager. The interviewee identifies a need for such a process and in some cases evaluations during the project's lifetime as possible improvements to the capital budgeting process. Consequently, the flexibility of a project is not something the firm considers but something the interviewee would like to incorporate in the capital budgeting process for projects of that nature. He states, with regard to the entire capital budgeting process, that: *"All investment decisions are different, you need to be flexible in your analysis and decision making"*.

4.4.3 Firm C

Two important factors affecting the project evaluation are environmental- and security issues of a project. The requirements of the financial metrics are loosened if these factors are part of the project. Also projects of greater strategic importance are evaluated with the loosened requirements. There is a standardized process for post-evaluation, however, post-evaluations of projects are conducted more frequently the larger the project undertaken. Projects are further defined by cost of undertaking the project in terms of where the decision is made. General Managers on a purely operational level can decide on projects up to 0.1 MSEK, projects up to 3 MSEK by a local business board, up to 10 MSEK on a business divisional level, up to 20 MSEK by the CEO. Larger projects are to be assessed by the board of directors. Flexibility it is not something that the firm incorporates into their process.

4.4.4 Firm D

All projects are to be evaluated using the same process, however, the interviewee identifies that when evaluating smaller projects, shortcuts are taken and the quality of the evaluation has to be less perfect. Projects are divided according to the size of the project where projects under 0.15 MEUR are decided on by vice presidents, 1.5 MEUR by the CEO and larger projects by the board of directors. The interviewee identifies a need for continuous evaluation of longer projects, but no standardized process exists, flexibility is therefore not explicitly incorporated in the process. Projects of great strategic value with less appealing financial metrics are carried out if top management give a go ahead. Flexibility is not something that is incorporated in the numerical evaluation but to some extent in the process as the person in charge of the evaluation should be well-prepared and should consider factors such as flexibility.

5. Analysis

The analysis chapter is where we apply the outlined analysis model to the empirical findings described in chapter 4. It is here that the theoretical framework and the empirical findings meet as we identify the potential theory-practice gap in the firm's capital budgeting processes. The analysis is, similar to the empirical findings, thematically structured and divided according to the findings in each firm. Finally, an overview is included to highlight patterns and similarities among the included companies, supporting us to formulate well-based conclusions and theories in the subsequent concluding chapter.

5.1 Cost of capital

5.1.1 Firm A

It cannot be exactly established how the cost of capital is calculated as a long time period has passed since it was done. The firm states that it uses a WACC but we can conclude that it is not estimated according to theory and hence a theory practice gap is present, since the theoretical approach for finding each component such as estimating the cost of equity, the CAPM-formula, is not familiar to the interviewee. The formula of adding 6 % to the market's interest rate is clearly not a theoretically acknowledged formula for WACC. Another indication of a gap is that the firm has used the same cost of capital for at least ten years, which is odd since the global economy has fluctuated a lot during this period, hence also the firm's true WACC.

5.1.2 Firm B

The firm uses the CAPM for estimating cost of equity, long-term government bonds as the risk-free rate and identifies each component in their cost of capital calculation with theoretically preferable techniques building up to a WACC. However, although the firm recalculates the WACC once a year, the firm has used the same cost of capital for a long period of time for organizational reasons. We can therefore not identify a theory-practice gap in the actual calculation of cost of capital but a clear gap in the way the firm implements the cost of capital in their capital budgeting process. The true cost of capital of the firm has certainly changed but not the cost of capital used for project valuation.

5.1.3 Firm C

The firm identifies the components the cost of equity and the cost of debt and weights these to a target capital structure to get a version of a WACC. A gap can be identified in the sense that each component is calculated using firm-specific techniques and formulas such as the CAPM seem unfamiliar. The firm employs a target cost of capital, which is not altered or evaluated on a regular basis conflicting with the theory-preferred way of letting the WACC reflect changes in the capital markets.

5.1.4 Firm D

The firm is unfamiliar with the term WACC and consequently the CAPM-formula and other theoretically preferred formulas for estimating the components in the cost of capital are also

unfamiliar. There is an obvious gap in the firms' techniques of calculating the cost of capital since the formula used, which is a country's main interest-rate plus 6 %, is not a formula preferred by theory. The fact that the firm has not adjusted the cost of capital for at least around ten years also displays the present theory-practice gap.

5.2 Capital Budgeting Techniques

5.2.1 Firm A

Firm A uses three CBT in their capital budgeting process but identifies the payback-technique as the first priority. The fact that the firm uses this CBT as their primary is what constitutes a theory-practice gap in their use of CBT as well as the fact that the NPV-technique is not one of the used CBT. The other techniques used in the capital budgeting process, the IRR- and the TVA-technique, are sophisticated in the way that they use a discount factor. However, the theory-preferred NPV-technique has several strengths compared to these as it identifies projects maximizing shareholder value (TVA fails) and can be used to rank projects (IRR fails).

5.2.2 Firm B

Even though top management as the first choice of CBT has recently put the IRR-technique forward in the capital budgeting process, a discounted payback-technique is the CBT communicated in the firm and is the unofficial primary technique. The IRR-technique as well as the discounted payback can be defined as a sophisticated technique since they incorporate a discount factor. However, as mentioned, theory supports the use of the NPV-technique. We can therefore identify a theory-practice gap as the two CBT used in the process fail to evaluate important aspects such as, ranking mutually exclusive projects and all cash flows contributed by a project (payback fails). Judging from the interview the attempt to implement the more sophisticated IRR-technique as the first choice in the capital budgeting process has failed, resulting in a wider gap between theory and practice than intended by top management.

5.2.3 Firm C

The capital budgeting process contains two CBT, the NPV- and the payback-technique, which are weighted equally in the process of evaluating projects. Both CBT are to be used to evaluate all potential projects and together support the decision-maker in making the right decision. Theory supports taking on all projects with an NPV greater than zero with no regard to the payback period as the value of money is incorporated in the NPV-model. The payback measure can of course be useful but should not, according to theory, influence firms to pass on projects with a positive NPV. As the firm uses the two CBT with the same weights, the interviewee identifies that the payback-technique can make managers pass on projects with positive NPV, primarily due to uncertainty of cash flows in the far future. A small deviation from the theory-preferred way of using CBT in the capital budgeting process can therefore be established due to the use of the payback-technique as a final decision measure.

5.2.4 Firm D

Three CBT are included in the firm's unique process for investment valuation, namely the NPV-, the payback-technique and a cost/benefit-ratio. The process is standardized and is, in line with theory, to be used to evaluate all potential projects. The different CBT are all weighted equally and used in order to get the full picture of a project. A minor theory-practice gap equal to the one in firm C's case can be identified regarding the use of all techniques as equally important since theory supports the NPV-technique as a measure capable of guiding a decision-maker by itself and should therefore be prioritized.

5.3 Risk

5.3.1 Firm A

Distinction of project-specific risk from firm risk, which should affect the cost of capital for the project, is carried out for every country that the firm operates in. Theory exemplifies other project classes where a separation can be made such as "speculative" or "new products" which should also affect the cost of capital due to higher exposure to risk. None of these class separations is considered and more importantly, theory states that international projects' risk should not be considered due to the country risk but to the correlation with the domestic market. We can therefore derive a theory-practice gap concerning how project-specific risk is incorporated into the capital budgeting process. The theoretical tool used to identify risk is a scenario-analysis and it is used mainly on the bigger projects. However, the firm does not adjust the estimated cash flow or the discount factor of a project, again showing the theory-praxis gap in the firm's treatment of risk.

5.3.2 Firm B

Firm B has no standardized procedure of handling risk and incorporation in the capital budgeting process is more or less absent. No project-specific risk is considered and projects are not divided into classes with different cost of capital. The only theoretical approach of identifying risk is some sort of scenario-analysis, which does not affect cash flows or discount factors. The theory-practice gap is evident.

5.3.3 Firm C

The firm has a standardized process of evaluating project-specific risk. In line with theory, the firm separates projects into different classes with four own identified risk factors that can affect the cost of capital of a project with different amounts depending on the identified risk. To analyze risk, the firm relies on the individual in charge of the project who evaluates the four factors qualitatively and according to theory this could be an acceptable approach. The only gap tendencies identified are the treatment of the risk factor country, which should be estimated by the correlation with the domestic market, no use of sophisticated simulations as well as no use of lower discount rates than the WACC.

5.3.4 Firm D

The firm incorporates risk in the capital budgeting process by including a sort of scenario-analysis in every project evaluation. The scenario-analysis should reflect risk as it identifies worst- and best cases, which could be a procedure accepted by theory. However, the firm does not adjust the cost of capital or divide project into different risk classes, which we identify as a theory-practice gap.

5.4 Project characteristics

5.4.1 Firm A

The standardized capital budgeting process used by the firm focuses solely on the use of CBT. The size of the project affects the process, as smaller projects are not subject to risk-analysis and post-analysis. This fact stands in contrast to theory, which supports all projects to be evaluated in the same process for comparability matters. Regarding other theoretical topics within capital budgeting such as strategic value, flexibility we can identify a gap between theory and practice since the firm states that it considers these factors but does not apply any of the theoretical approaches to value them in the process. Other characteristics such as the separation of mandatory-, expansion- and cost-saving projects are not handled by theory and the lower requirements in mandatory projects is therefore a practical issue resulting in the fact that no gap can be analyzed.

5.4.2 Firm B

The theoretical approaches to value flexibility and strategic value are not considered. Valuations of projects are fully up to the project manager i.e. all projects are evaluated differently which is in contrast to theory. If a larger project is evaluated, the process is slightly changed since the final decision is made on a higher level in the organization. Other characteristics that the firm considers such as cost saving or replacement do not affect the process and the present gap is therefore the earlier identified. Further, there is neither a follow-up process incorporated in the capital budgeting process and we can therefore identify a clear theory-practice gap.

5.4.3 Firm C

The firm has a rigid capital budgeting process and, in line with theory, the firm uses a follow-up process. The theoretically supported strategic value of each investment is incorporated in the process as requirements might be lowered for such projects. However, there is no implementation of this in the actual numerical valuation such as decision tree analysis etc. We can therefore identify a theory-practice gap regarding the aspect of flexibility characteristics of a project in the project evaluation. Regarding the lower requirements that the firm has on projects with security and environmental aspects, theory does not consider these aspects and therefore we can only present our findings of these aspects but not analyze any theory-practice gap. Other project characteristics the firm considers are the size of a project, which affects where in the organization the decisions are made. According to theory, this is nothing that should affect the process.

5.4.4 Firm D

In line with theory, a follow-up process on projects undertaken is incorporated in the firm's standardized capital budgeting process. Other theoretical characteristics such as strategic value and flexibility are not valued and might only be considered by the project manager. Therefore the gap between theory and practice in firm D consists of the lack of structured processes around these two aspects. Another characteristic affecting the process is the size of the project, which only changes the level at which, the decisions are made but not the process behind each project and can therefore be labeled as theoretically correct.

5.5 Applying the analysis

Theory-Practice Gap	Firm A	Firm B	Firm C	Firm D
Cost of capital	Large	Medium	Medium	Large
CBT	Medium	Medium	Small	Small
Risk	Large	Large	Small	Large
Project Characteristics	Medium	Large	Medium	Medium

The matrix is an overview of the performed analysis by the authors. The identified gap is labeled Large, Medium or Small.

Firm C and especially firm B show a better understanding of the theoretical term WACC and use a theoretically more preferable approach when calculating their cost of capital. Firm A and D do not use a theoretically preferable approach and therefore show an obvious theory-practice gap in their calculations of cost of capital. All firms look at the topic with a relaxed attitude as the quote: *"Differences of 1 - 2 % in the cost of capital does not matter when running such a large organization"*, displays and this sums up the overall attitude very well. The fact that none of the included firms have changed their cost of capital for a long period of time indicates that the firms do not put a lot of effort on using an accurate cost of capital. There is an evident theory-practice gap in the firms concerning the implementation of theoretically preferable cost of capital formulas in the capital budgeting processes. Using this analysis we categorize the firms B and C into a medium gap and firm A and D into a large gap.

An apparent theme in firm's use of CBT is the importance of the payback-technique, which is the only CBT used by all firms. Firm A and B state it to be the first choice of CBT and the other firms state it to be equally important as the other CBT. Although the heavy reliance on the payback-technique, all firms employ other more sophisticated CBT together with this technique. Both firm C and D employ the NPV-technique and we therefore categorize these firms into a smaller gap than to firm A and B. The gap between theory and practice in the use of CBT mostly lays in the heavy communication of the payback-technique as well the general limitation of a short payback rather than looking upon the technique as complementary source of information.

Three out of four companies more or less overlook project specific risk and in the cases where identification is done, they do not incorporate risk in the numerical valuation. None of the firms use more advanced risk-analysis methods, such as Monte Carlo simulation. However, firm C differentiate itself from the others as the firm looks at specific risk factors and also incorporates the identified risk into the cost of capital of the project. Therefore we categories firms A, B and D into a large gap and C into a small gap.

Important project-specific characteristics described by theory, such as strategic value and flexibility are clearly something that the firms want to communicate that they consider in their capital budgeting processes. However, none of the firms incorporate these factors in the actual numerical evaluation of projects through decision trees or ROA, which is the theory-preferred way. The only part where theory and practice meet to some extent is regarding the follow-up process, which three out of the firms state is a component in the process but according to themselves something they rarely perform.

6. Study findings

This chapter summarizes and emphasizes the most important findings of this study as theory and empirical data has been analyzed in the previous chapter. This chapter is where the authors are able to reflect on the outcome of the study and identify greater relationships and tendencies perhaps outside the analysis model. Conclusions are, similar to previous chapters, structured in a thematic way also including the research questions to ensure that the purpose of this thesis has been fulfilled. A view of this study's findings as input for future research within the area is finally included as well as possible actions to consider for the firms included.

6.1 Cost of capital

- How do the firms estimate the cost of capital used in their CBT?

The most prominent finding in our investigation of how the firms use and estimate the cost of capital lies in the heavy use of a target- or a fixed cost of capital. The firms value the convenience of having a well-known and implemented cost of capital higher than using the most accurate one in their operations. Financial processes within the firms are designed in ways that a change in cost of capital is hard and costly to implement, resulting in the use of a cost of capital more or less fixed, at least for each geographic- or legislative area. The firms are familiar with the term WACC and believe they use it but we can conclude that it is not used in line with theory. Using the cost of capital in this manner prevents the firms from accurately deciding which projects contribute to firm value, a fundamental part of corporate finance theory. Our findings regarding the estimation of cost of capital is more in line with earlier international research such as Oblack & Helm (1980) than later international research such as Ryan and Ryan (2002), indicating a slower adoption process of the theoretically preferred WACC measure in the firms included.

6.2 Capital Budgeting Techniques

- What CBT do the firms use?

At first glance, our empirical findings seem to show a small theory-practice gap in the use of CBT due to the use of sophisticated CBT by all firms. The general theme in this study is, however, that the payback-technique is the most frequently communicated CBT, arguably making it the most important CBT used by the firms. Another apparent theme is that the payback measure is often seen as a risk measure due to the uncertainty that comes with estimating cash flows far in the future. Due to the reoccurring requirement of a limited payback period the more sophisticated techniques become somewhat overlooked and good low-risk projects adding to firm value can be passed on due to their long payback. The heavy reliance on the payback measure is in line with Sandahl and Sjögren's (2005) findings but we can add to their findings that the payback measure is given high priority often used as the first choice of CBT. We can therefore verify their result of a theory-practice gap in the use of CBT in the investigated population.

6.3 Risk

- What risk analysis methods do the firms use and how do they incorporate project-specific risk in their capital budgeting process?

This study finds that risk is something the firms have problems estimating, analysing and handling in a structured or standardized manner. The firm's approaches are in line with what Smith (1994) defines as intuitive methods and more advanced analytical methods such as Monte Carlo simulation are outside the firm's knowledge base. As for what earlier research has found on this topic it is hard for us to compare and relate our findings mainly due to differences in study design. However, the theme of using qualitative/intuitive risk analysis methods through scenario-analysis is apparent and partly similar to the results of Arnold & Hatzopoulos (2000). Regarding the use of the theory-preferred risk analysis method of adjusting the discount rate used in evaluating a project we can see similarities to Bruner et al. (1998) as the firms seem to have problems turning risk analysis into numerical metrics to incorporate in a discount factor.

6.4 Project characteristics

- What project characteristics affect the capital budgeting process?

Characteristics such as mandatory, environmental or security aspects, not surprisingly lower the numerical requirements, changing the criteria for undertaking a project. Aspects put forward by theory, such as strategy and flexibility are also characteristics affecting managers to change the criteria for undertaking a project. However, these issues are not quantified and only incorporated in the capital budgeting process qualitatively. In line with Sandahl and Sjögren (2005) we therefore find that the firms in this study do not incorporate theoretical approaches such as ROA or decision-trees in the capital budgeting process in order to value these characteristics. Post-evaluation of projects correlates is generally within the standardized capital budgeting process. On the other hand, the use of such a process correlates well with the size of the project, meaning that larger projects are port-evaluated more often. This results in limited evaluation of the tools used for project valuation.

6.5 Reasons behind the theory-practice gap

- Why do the firms use the capital budgeting process found in the empirical study?

This study confirms some of the hypotheses put forward by previous research as to why theory and practice differ, further described in the problem discussion. We can conclude that there are areas within capital budgeting where the firms have limited or no knowledge of theoretical approaches resulting in reliance on less theoretically correct approaches. The fact that top managers, who are responsible for the design of the capital budgeting processes, are generally in the end of their professional career and therefore have not been educated in modern corporate finance theory is what we identify as the main reason for the knowledge gap. A factor highly regarded by the firms is the importance of being able to communicate project evaluation within the organisation. People of different academic and professional background are supposed to understand the measures, which lead

to the use of simple techniques, such as the payback. Tradition is also a factor of substantial weight. Even if the theoretical knowledge is to some extent present within the firms, the traditional process is hard to change. The tradition factor is supported by the fact that large Swedish Industrial Engineering firms are considered among the best run firms in the world and that their historical performance has been outstanding. We can therefore identify a notion of “why change something that works” within the firms.

Apart from being able to confirm some of the hypotheses suggested by theory within the investigated firms, we believe that the key reason for the theory-practice gap lies within the priority of capital budgeting issues on management’s agenda. We can identify from our in-depth study that capital budgeting is not top priority, as little discussion and evaluation of the process appear to take place. One hypothetical reason to this is that managers are rewarded for short time profitability, which fits well with a heavy reliance on the payback-technique and affects their incentive to modify the current capital budgeting processes. Consequently, the fundamental strategy in corporate finance theory of undertaking on all projects adding to firm value, i.e. with an NPV greater than zero, is not employed with the highest priority. We believe that prioritizing this goal would lead to the adoption of more sophisticated, theory-preferred techniques as these identify projects that add to firm value. In the beginning of this thesis we highlighted the importance of investment policy using the following quote:

“The survival and vitality of a corporation are determined by its ability to regenerate itself through the allocation of capital to productive use. The selection and employment of processes and techniques to decide major financial commitments are crucial.” (Arnold & Hatzopoulos, 2000, p. 603)

Based on the study findings, we can conclude that; the allocation of resources to productive use, i.e. to projects adding to firm value, can be enhanced by improvements in the capital budgeting process. Managers should, according to us, take action to overlook their capital budgeting process to better be in line with the goal of maximizing firm value, a fundamental aspect of corporate finance.

6.6 Areas for future research

This study’s contribution to the academic world consists of the identification of several reasons as to why a theory-practice gap exists in the included firms. We identify the following areas of the subject as interesting for future research.

- An obvious extension of this research would be to include all types of investments processes in a similar study in order to get a full picture of the capital budgeting area.
- A similar study in other industries to investigate whether the findings are consistent. Since these reasons are derived from the four firms it would be interesting to use these as hypotheses in quantitative research to investigate whether the reasons can be generalized for larger populations.

- To investigate the difference between Swedish and international firms. A study investigating how firms in different countries reflect on the findings of this study would be interesting, as foreign firms, judging by previous research, have overcome or not experienced the barriers to theory implementation identified by this study.
- Capital budgeting is only one yet important, area concerning investment policy and conducting a similar study with regards to project identification, implementation stage etc. would be of interest as more impediments and reason could be identified.
- It would be interesting to investigate the hypothetical relationship between reward systems based on short time profitability and capital budgeting practices.

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7.2 Interviewees

SKF headquarters, Gothenburg (2011-04-12)

Sandvik headquarters, Sandvik (2011-04-27)

Atlas Copco headquarters, Stockholm (2011-05-02)

Alfa Laval headquarters, Lund (2011-05-05)

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8. Appendix – Interview outline

Follow-up questions are to be included together with all thematic questions to ensure understanding of the “why” factors to each theme as well as questions on issues identified during interview.

1. Warm-up

- What is your position within the firm?
 - Describe the main tasks in your daily work?
- What is your academic background?
- In what areas do you have professional experience?
- Define project types.
- What is your firm’s preferences concerning the use of your name in our thesis?

2. Thematic questions

2.1 Cost of Capital

- Does the firm have a cost of capital?
 - Is it adjusted for divisions, countries etc.?
- How is it calculated?
 - Do the firm use the CAPM or APM formula for estimation of the cost of equity?
 - How is the cost of debt estimated?
 - How is the risk-free rate estimated?
 - What capital structure is used?
- How often is the cost of capital reevaluated?
- Why...?

2.2 CBT

- Does the firm have a policy concerning CBT used for project evaluation?
 - What CBT are used?
 - In what order are these prioritized?
- How are these CBT designed technically?
- Why...?

2.3 Risk

- Does the firm make a distinction between firm risk and project-specific risk?
- What risk analysis methods does the firm use?
 - Is the identified risk incorporated in the CBT?
- Is there a standardized risk analysis process?
- Why...?

2.4 Project Characteristics

- What project specific characteristics affect the capital budgeting process?
 - In what way is the process adjusted?
- Does the firm consider strategy or flexibility?
- Is there a post-evaluation process and when is it carried out?
- Are these factors incorporated in the CBT?
- Why...?