UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

FEG-314, Industrial and financial management

What is the optimal capital structure for PS Partner, a private company, in order to maximize the value of the firm?

Bachelor thesis, 15 hec

Spring 2016

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Abstract

This thesis is a study aimed to find the optimal capital structure for PS Partner, a private company active within consulting and recruitment. Since financing decisions and structural partitioning between retained earnings, equity and debt will affect the market value and hence the cost of capital, this study focused on estimating parameters to find an optimal leverage ratio for financing and thereby maximize the value of the firm. The optimal capital structure for the private company was estimated using the trade-off theory by weighing the effects of leverage from the benefit of a tax shield against the disadvantage of increasing the risk for financial distress.

Owners of private companies often have a majority of their current wealth invested in the company, whereas they lack financial diversity compared to investors of public companies. It has been argued that several economic models are originally designed for public firms and therefore need to be adjusted prior to use in private firms, e.g. to compensate private investors for the increased risk. In this study, the optimal capital structure was estimated to $\approx 30\%$ debt of the firm's value, which generated a market value of approximately 20.4 MSEK, an increase of 5,4% compared to the present value. Without leverage, the required return on equity was estimated to 12 %. At the optimal capital structure, the cost of capital was estimated to 11% with a required return on equity of 15%.

Keywords: Optimal capital structure, trade-off theory, financial distress, private company, cost of capital, valuation.

M. Hulth and S. Börjesson

Table of content

1. Introduction

In this chapter the background of the study is highlighted with a problem discussion to introduce the reader to the subject. This is followed by a literature review of previous studies within the area to present a broader economic background to the study objectives and review previous studies within the field. The section also includes the problem definition, the main purpose and delimitations of the study.

1.1 Background

On a daily basis companies face decision- making related to capital structure and general financing. In general, financing originates from three different parts within an organization: internal funds, debt and equity. The choice of capital structure will affect the cost of capital and hence the market value, as introduced by e.g. Modigliani & Miller (1963) and Baxter (1967). When leverage reaches a certain value, company devaluation and unnecessary leverage are created (Kraus & Litzenberger 1973). Thus, to maximize the value of the company, decision-makers need to optimize the capital structure. This thesis investigates PS Partner, a private company based in Gothenburg active within consulting and recruitment. Main assets of the company are based on human resources which affect the cost of capital and the market value of the company. This company was chosen because it is active within an interesting industry, and is privately held. Further, the CEO was keen to find out how an optimization of the capital structure would affect the firm's value.

Previous studies have mainly focused on estimating the optimal capital structure of public companies or for an entire industry (e.g. Almeida & Philippon 2007; Mukherjee & Mahakud 2012; Amaya et al. 2015). Brav (2009) studied differences between public and private companies for a large sample size. In contrast, this study focuses on the optimal capital structure for a specific company active in a specific market. Since 99,7% of all companies in Sweden are privately owned (SCB 2016), it is highly relevant to study how private firms are affected by their capital structure.

There are several differences between private and public firms, such as availability of information, the possibility to diversify for investors and the access to an external capital market (Damodaran 2012). Most commonly used models of capital structure are designed for and are normally based on the economic situation of public companies (Berk & Demarzo 2012).

These models therefore need to be revised in order to better meet the economic structure of private companies (Damodaran 2012). In the present study the trade-off theory is used to find the optimal capital structure for a privately held company. According to the trade-off theory, the value of a firm is maximized at the optimal capital structure (Kraus & Litzenberger 1973). The optimal capital structure trades-off the marginal benefit of the tax shield against the marginal downside of debt, shown by the increased risk defined as the cost of financial distress.

1.2 Problem discussion

This thesis focuses on a practical problem associated with the capital structure of a small private company in a real context. A complete set of information critical to estimate the optimal capital structure is normally not available for outsiders of private companies. Hence, it is normally more difficult to accurately estimate effects of leverage for private companies than for public companies. Since common theories of capital structure are based on the availability of market values, models for capital structure need to be adjusted to meet private companies (Damodaran 2012).

Since the quantity and quality of available information for private firms are lower than for public firms, the cost of capital will increase (Easley & O'Hara 2004). Private firms are generally not governed by as specific reporting standards as those of publicly traded firms (Aktiespararna 2010). Due to such differences economic insights available for investors tend to be more limited in private compared to public companies. Easley and O'Hara (2004) demonstrated that investors of private companies normally require higher return to hold stocks with greater information asymmetry. The demand for higher return reflects an increased risk for the uninformed investor. Additionally, private firms have no market prices on equity (stock price) and hence, calculations for a private firm with benchmarking against public firms need to be done.

When estimating the cost of equity, beta (ß) is a measure of the systematic risk of an investment added to a diversified portfolio (Markowitz 1952). Consequently, the systematic risk can be used for companies where the marginal investor is diversified. In private companies, however, the owners often have a majority of their wealth invested in the firm. The potential to diversify is therefore often low for investors of private companies (Damodaran 2012). As a consequence, the systematic risk (beta, ß) will be underestimated for private companies if no adjustment is made (Damodaran 2012). In this study, an adjustment is motivated because PS Partner consists of only two owners, who are also employees of the firm. Limited potential for diversification is therefore assumed. Only two owners, not separated from the decision making, also indicates that there is no agency problem.

Ps Partner has currently no long-term debt and lacks the advantage of a tax shield. According to the trade-off theory, the firm's value is therefore not maximized. This study investigates if the firm's value would increase by taking on leverage in the firm's capital structure. An excessive leverage ratio leads to company devaluation with a trade-off between the marginal benefit of debt (the tax shield) and the downside of debt (the risk for financial distress). This was performed to find the optimal capital structure using adjusted economic models to fit a private company.

1.3 Literature review

Brav (2009) studied differences between public and private companies on the UK market. The author concluded that limited research had been performed on the capital structure for private companies, even though 97,5% of all firms on the UK market are privately held. There were significant differences in cost of equity between public and private firms and in the determinants of financial policies.

Brav (2009) found that the larger the value of control and the information asymmetry of a company, the less probability for the company to visit external capital markets (Brav 2009). In order to maintain the control of the company, private firms take on more debt when external capital is required. Specifically, private firms with dispersed ownership and with information transparency are more likely to visit external capital markets. Since private companies rely on generating capital internally, their cash holdings and dividends are more sensitive to the performance of the company.

Private firms face higher costs to access the external capital market than public firms. The control of a public company is distributed across a wide spectrum of shareholders, of which most have only limited influence of decisions made by the company. In contrast, a private company is held by only a few owners and each owner has normally a large influence of decisions made by the company. This difference in influence implies that the cost of issuing equity (to give away control) is more expensive for private firms than for public counterparts. According to Brav (2009) the average ratio of short-term debt to long-term debt was 64% for private firms, while the corresponding ratio for public companies was only 37%. Private firms can thus provide liquidity to their debt holders by raising a larger proportion of short-term debt. In addition, public companies can also provide liquidity by issuing equity or even public debt, which is only possible for private firms in terms of short-term debt.

The average growth rates and capital expenditures are normally larger for public than private firms and, normally, every business is private in the initial phase. This suggests that firms with higher growth rates and higher capital expenditures are most likely to go public, a conclusion supported by observations made by Brav (2009).

Amaya et. al (2015) developed an optimal strategy for risk management to investigate how leverage affected the cost of capital, hedging, investment decisions and dividend distributions of large public firms. Their study was based on 384 public companies in the industrial sector of the North-America Industry Classification System (NAICS) listed with an S&P credit rating. These authors concluded that previous articles did not capture important real-world features although they were important for the decision making.

Amaya et. al (2015) found that when leverage was low, the firms fully activated investments that arose and payed dividends. When the level of debt increased, the firm stopped paying dividends while still fully investing. After reaching even higher levels of leverage, the firm reduced investments and finally stopped investing completely. Amaya et. al (2015) found an optimal debt level where the relative value of the firm was maximized at 38 percent debt when opportunities for investments were available, while 40 percent when investments were not available. Another important finding from the study was that firms did not seem to take full advantage of a tax shield. Firms rather kept a higher proportion of equity than optimal whereas the leverage ratio was lower compared to when WACC was minimized.

Our study is different from Amaya et. al. (2015) in several aspects. For example, Amaya et. al. (2015) focused on stock-listed companies on the American market while our study is based on one specific private company in Sweden with a small market share. Further, results in Amaya et. al. (2015) were based on the assumption that firms either have or do not have opportunities for investments. The present study rather investigates how an optimal capital structure could be estimated for a specific private firm. Amaya et. al (2015) investigated several factors and used a risk management strategy including capital structure. In comparison, our study only includes the optimal capital structure and does not consider e.g. hedging.

Furthermore, as Amaya et. al. (2015) focused on publicly held firms on the American stock market and our study is rather based on one private company not listed on the market, there was a difference in the availability of economic information. In principle, while necessary information available in Amaya et al. (2015) benchmarks to other companies is used to estimate the capital structure in our study.

Mukherjee and Mahakud (2012) investigated if the trade-off theory and the pecking order theory are mutually exclusive or complementary to find the optimal capital structure for Indian public manufacturing companies. The researchers concluded that financial decisions of companies are best explained by the pecking order theory where firm specific variables such as; company size, tangibility and market-to-book-ratio are statistically significant and affect both the book- and the market value of leverage. Importantly, companies do have a target ratio and the cost and benefit of debt as well as the information asymmetry play a significant role when estimating the optimal leverage ratio for Indian manufacturing companies.

Furthermore, Mukherjee and Mahakud (2012) demonstrated that the Indian companies do have a target debt level and adjust their debt towards the optimal at a speed of about 40%. The speed is defined from deviations of the capital structures of firms towards their optimal level, and from the statistical spread of deviations. According to Mukherjee and Mahakud (2012) there are problems with information asymmetry on the market. Therefore, the pecking order theory and the trade-off theory are not mutually exclusive.

Mukherjee and Mahakud (2012) observed that companies adjust their leverage towards the optimal ratio and that the cost and benefit of debt together with asymmetric information are the most significant factors. With this information it is interesting to study and analyze how these costs affect a private firm on the Swedish market. Compared to Mukherjee and Mahakud (2012) the focus of our study is to estimate the optimal capital structure for a specific company rather than to investigate if certain variables affect the capital structure for an entire industry. Furthermore, the Indian market (Mukherjee and Mahakud, 2012) is different than the Swedish market (this study). Although they investigated the Indian market, their results confirm that our variables, such as the cost and benefit of debt, play a significant role when estimating the optimal capital structure.

1.4 Problem definition and main objective

Particular emphasis of the present study is to investigate how leverage affects the cost of capital and hence the market value of a small private company. Based on i) the information asymmetry between private and public companies; ii) common theories of capital structure often assume availability of market values; iii) the systematic risk of an investment added to a diversified portfolio is often underestimated for private companies, the main objective of this thesis is to:

- Evaluate the optimal capital structure for PS Partner, a small private company, in order to maximize the value of the firm.

1.5 Purpose and approach

The main purpose of this study is to find the optimal capital structure for a private company using the trade-off theory to maximize the value of the firm. Since PS Partner was established sex years ago and has never been exposed to long-term debt, the owners are keen to understand how leverage affects the value of the firm. Their current business includes no leverage and therefore they do not benefit from a tax shield which potentially would increase the value of the firm.

According to Easley and O'Hara (2004), investors normally require compensation for an increased risk. In conjunction, Damodaran (2012) argued that investors of private firms should be compensated for non-diversification. These studies highlight the importance to study how investors of private firms should be compensated for non-diversification and increased risk exposure compared to public companies. The business register of the Swedish stock market states that 99,7 % of all companies are privately held (SCB 2016). Although public companies only constitute a minor fraction of the total market, previous studies have mainly focused on optimizing the capital structure for public companies (e.g. Almeida & Philippon 2007; Mukherjee & Mahakud 2012; Amaya et. al. 2015). Our vision is that models adjusted in accordance to the present study can be applicable to a majority of all private companies when optimizing the capital structure, regardless of industry.

1.6 Delimitations

Initial delimitations were needed to ensure the feasibility of this study due to the limited time frame. Since common models of capital structure are based on the availability of market values and PS Partner is a privately held company, our initial knowledge about the subject was limited. Significant efforts have been made within the present project to adjust the models and make them suitable also for a private company.

It is considered outside the scope of the study and not within the available time frame to add more companies to the model. Future studies with the objective to evaluate a range of public and private companies according to similar theories as those presented here, would be recommended. The models are not tested for statistical significance or further validated with empirical observations. Furthermore, risks associated with a limited liquidity and information asymmetry are not included in the calculations but rather used as a tool for discussions.

2. Method

This section summarizes the methods of the study and the scientific approach to explain in detail how results have been calculated. The scientific method was introduced to describe choices of methodologies and methods for collecting empirical data.

2.1 Summary of method

In order to find the optimal capital structure that maximizes the value of the firm, a deductive approach has been used. Results estimated through models related to the capital structure based on historical data were compared to theories available for capital structure of private and public companies. The following chapter explains and motivates the methods and equations used to implement this study.

2.2 Scientific approach

To be able to find the optimal capital structure for a private company it is important to understand the main factors that affect the capital structure and how these factors correlate to the value of the firm. Relevant theories are used to explain the optimal capital structure for a private firm and to describe how the marginal effects of leverage affects the value of the firm.

Our model originates from theories for a perfect capital market, without taxes and transaction costs (Modigliani & Miller 1958). In a perfect capital market, the value of a firm is independent of the capital structure of the firm. Thus, the unlevered value of the firm equals the levered value of the firm. In Modigliani & Miller (1958) it was also described how the required return on equity increases with leverage due to the increased risk, although the weighted average cost of capital remains unchanged when taxes are ignored.

Taxes have been included in economic models, normally with the assumption that debt is beneficial in terms of a tax shield which increases the value of the firm (Modigliani and Miller 1963). However, excluding the downside of debt by the increased risk of financial distress that comes with leverage is not a holistic assumption and has been criticized by several studies (e.g. Baxter 1967; Gordon 1989). For example, Baxter (1967) argued that leverage affects the cost of capital and the value of a firm. The trade-off theory developed by Kraus and Litzenberger (1973) introduced a model that trades off the marginal cost of debt against the marginal benefit of debt.

Their model has been widely used (e.g. Almeida & Philippon 2007; Mukherjee & Mahakud 2012; Amaya et al. 2015) and were applied in this study together with theories described in Kraus and Litzenberger (1973) to estimate the optimal capital structure for the private company PS Partner. In order to apply these theories, the formulas were modified to better fit privately held companies. For example, market values are normally not available for private companies.

The required return of equity for PS Partner was calculated using the capital asset pricing model (CAPM) introduced by Sharpe (1964), Lintner (1965) and Mossin (1966). Further, the model included a modified beta-value of the company. The beta-value was modified because beta cannot be calculated for small private companies not traded on a traditional stock market. Different methods have been used to estimate beta-values as if the private company would be publicly held. A commonly used method, normally associated with low standard errors, is the bottom-up beta (Damodaran 2012). In principle, a bottom-up beta is estimated by benchmarking against similar public companies, in this case within the areas of recruitment and consulting.

The average of beta-values was included in the model to estimate the systematic risk for PS Partner and companies with a similar economic situation. Since PS Partner is privately held, a non-modified average beta-value would constitute an inappropriate measure during calculations of private companies (Damodaran 2012). Therefore, to compensate for non-diversification of small private companies, beta-values need to be adjusted. The average beta of the samples was modified to an unlevered beta as discussed by Damodaran (2012). From the unlevered beta the total unlevered beta was estimated by adjusting for non-diversification.

To study how leverage affected the systematic risk of the company, the total unlevered beta-value was modified by accounting for the leverage, called total levered beta. The total levered beta is a function of the total unlevered beta, the current corporate tax rate, and different debt levels. Overall, this beta compensates for non-diversification and higher risk exposure. Consequently, once the total levered beta-values were obtained the required return on equity was modelled. The capital asset pricing model, a function of the risk-free rate, total levered beta and market risk premium, was used to compare how the required return on equity varied with different levels of debt.

Furthermore, to calculate the weighted average cost of capital, the borrowing rate (cost of debt) was estimated. The cost of debt is a function of the risk-free rate and a default spread that depends on the credit rating of the company. As PS Partner does not have long-term debt or a credit rating, a synthetic credit rating was used in the revised model (Damodaran 2012). The synthetic credit rating is based on an interest coverage ratio from a sample of similar private firms. The synthetic credit rating represents a default spread and by adding the risk-free rate, the synthetic cost of debt was obtained (Damodaran 2012).

The weighted average cost of capital (WACC) was estimated with different leverage ratios in order to study how WACC varies with increasing leverage. The combination of required return on equity, WACC with and without taxes and WACC with downside of debt included for different leverage ratios, provided a general tool to describe how the capital structure was affected by relaxing the assumptions to approach a real-world context.

To calculate the value of a firm with benefits and costs of debt, the trade-off theory was used, including costs of financial distress (Kraus & Litzenberger 1973). Costs of financial distress include both indirect and direct costs of bankruptcy (Berk & Demarzo 2012). The optimal capital structure was estimated with the trade-off theory by evaluating how different levels of debt affected the cost of capital and the value of the firm. To estimate how leverage affects the cost of capital, values of the firm such as: stock prices, beta of the stock and capital spending must be included. A benchmark was made towards the public company SJR in Scandinavia AB from the sample since a private company does not have such information available for outsiders. SJR was chosen because it is a company with low book value of equity and it is a company without long-term debt. SJR is also active in the same business area as that of PS Partner.

2.3 Scientific Method

In order to find the optimal capital structure for our partner company PS Partner, this thesis evaluated different ratios of leverage and how leverage affected the value of the firm. This study is quantitative since information was collected from historical data such as annual reports. In addition, secondary data was collected for the sample of the public and private firms in order to benchmark. Collis and Hussey (2009) stressed the importance of sampling method and to apply an appropriate method to the specific company to avoid sampling errors in the final estimations.

A deductive approach was used by comparing the derived results against theories of capital structure. A deductive approach, comparing theory with observations and generated results, is often referred to as theory testing (Bryman & Bell 2011). Additionally, a deductive approach is usually associated with quantitative methods. Previous studies have mainly investigated the capital structure for an industry or a large sample of public companies (e.g. Almeida & Philippon 2007; Mukherjee & Mahakud 2012; Amaya et al. 2015). Also, previous studies have excluded qualitative methods and we find no further reason to include such methods in this study. A quantitative method is relevant to use when collecting data to quantify the problem to remain objective (Collis & Hussey 2009). A quantitative approach uses data that can be measured to uncover patterns within the area (Bryman & Bell 2011). A deductive approach is motivated to use because the theory within capital structure is extensive but few studies have been made on the effects of capital structure for private firms.

PS Partner is privately held and accordingly, all necessary information is not available for outsiders. To estimate unknown variables, a benchmark was made against public and private firms. With this in concern, a quantitative method is relevant to use in order to quantify the variables needed and to formulate research objectives and a scientific approach from these findings.

Previous studies (e.g. Brav 2009; Mukherjee and Mahakud 2012; Amaya et.al. 2015) have mainly used statistical tools with empirical observations to estimate the capital structure. Since this is a study that focuses on a small private firm, model adjustments were made (Damodaran 2012). Damodaran (2012) provides relevant tools and a thorough description of how theories of capital structure are adjusted to better fit criteria for a private firm.

2.4 Method for collection of empirical data

Since economic information for private companies is limited, it was necessary to benchmark against relevant public and private firms (Damodaran 2012). Secondary data for PS Partner and the benchmarking companies was collected from annual reports found in the database *Retriever Business*. Relevant articles were collected from the database *Business Source Premier*.

2.4.1 Sample of public companies

Since PS Partner is a privately held company, beta-values are not publically available. Beta-values were therefore estimated using benchmarking against similar public companies to calculate the required return of equity (Damodaran 2012). The sample of public companies used in this study is shown in Table 1. The companies are listed on the Swedish stock market and they are active within consulting or labor recruitment, i.e. the same area of industry as that of PS Partner.

Table 1. Public companies used during the benchmarking.

Public companies	
BTS Group AB	Rejlers AB
Intellecta AB	Semcon AB
Intrum Justitia AB	SJR In Scandinavia AB
NetJobs Group AB	Uniflex AB
Poolia AB	WISE Group AB

2.4.2 Sample of private companies

Currently, PS Partner has no long-term debt. Therefore, a benchmark was made against similar private companies to estimate the cost of debt and the cost of capital for the firm (Damodaran 2015). The private companies selected for the benchmarking are shown in table 2. The firms have revenues between 2.4 MSEK and 13 MSEK, interest bearing long-term debt and few fixed assets.

Table 2. Sample of private companies used for the benchmarking.

Company name	
Alingsås Företagsservice AB	Next U AB
Asken Finans AB	Österlenrevision AB
Claes Erik Lundgren AB	Sprint Dalarna AB
Esstvätt AB	Vic Självkem i Visby AB
God Service i Sverige AB	Vic Textiltvätt Aktiebolag
Loop i Sundsvall AB	Yrkeskonsult i Sundsvall AB
Musikevent Hoxell AB	Zeventy AB

3. Theoretical framework

Throughout this chapter theories and models used to answer the research question are explained with particular emphasis to make them suitable for private firms.

3.1 Differences between public and private firms

According to Damodaran (2012) there are four significant differences between private and public firms.

1. Public firms are set up according to accounting standards that allow investors to identify and compare e.g. earnings across firms and industries. This is not always the case for private companies, where a wide range of accounting methods can be used. It is therefore more difficult to compare private compared to public firms, within and between industries.

2. The information available for outsiders is less for private firms compared to for public firms. This difference includes both historical and present information such as cash flow statements.

3. Public firms normally share and constantly update important economic information. This is often not the case for private firms, since shares are not traded on a stock market. This may be a problem when equity assets need to be liquidated, since the other part lacks information. Information asymmetry was introduced by Myers and Majluf (1984) under conditions where a potential buyer only invests at a discounted price. Thus, the market value is generally lower for a private firm than for a public company, in part due to this information asymmetry.

4. To run a private company, the owners generally have a majority of their wealth invested in the firm. As a consequence, the potential to diversify is therefore often low in private companies. In contrast, investors of public firms have the opportunity to diversify since they normally have only a small fraction of their wealth invested in the company. As a consequence, the systematic risk of an investment added to a diversified portfolio (betas, ß) will be underestimated for private companies if no adjustment is made (Damodaran 2012). In this study, beta-values were adjusted for non-diversification. Thereby, investors of private firms were compensated for with a higher return on equity, which is in accordance with the enhanced risk exposure.

In addition, private firms are also less likely to visit the external capital market due to asymmetric information. In theory, outsiders are only willing to pay a discounted price for the assets (Myers & Majluf 1984). The liquidity risk of private firms is also higher than for public firms since private firms can raise liquidity mainly from short-term debt or internally generated earnings. Private companies are therefore more sensitive to the performance (Brav 2009).

3.2 Unlevered beta

The unlevered beta is a measure of the systematic risk when there is no leverage. A benchmark was made against public companies similar to PS Partner (Table 1) where the average of their beta-values ($\bar{\bar{\beta}}_j$) was calculated according to equation 1. Beta-values without leverage (unlevered beta; β_U) were estimated from equation 2. (Damodaran 2012).

$$\bar{\bar{\beta}}_j = \frac{\sum_{i=1}^{n} \beta_i}{n} \qquad\qquad \text{Equation 1}$$

β_i = Beta-value of firm i.
n = Number of firms in the sample.

$$\beta_U = \frac{\bar{\bar{\beta}}_j}{1+(1-(1-T_c)*\frac{D}{E})} \qquad\qquad \text{Equation 2}$$

$\bar{\bar{\beta}}_j$ = Average beta of the sample.
T_c = Swedish corporate tax rate.
$\frac{D}{E}$ = Average of the sample's book value of debt-equity ratio.

3.3 Total unlevered beta

In order to compensate private investors for non-diversification, equation 2 was modified into equation 3 to calculate the total unlevered beta (β_{TU}) for private companies and thereby minimize underestimations of the risk (Damodaran 2012).

$$\beta_{TU} = \frac{\beta_U}{\rho_{i,m}}$$
Equation 3

$\rho_{i,m}$ = Correlation coefficient.

In the capital asset pricing model (CAPM), investors are compensated for by the systematic risk exposure to the market. CAPM is mainly used for public firms where investors are mainly characterized as marginal investors with a diversified portfolio and unlimited access to an external capital market (Sharpe 1964; Lintner 1965; Mossin 1966). In CAPM it is generally assumed that information is publically available for outsiders. Investors of public firms are therefore only compensated for the systematic risk.

In contrast, investors of private firms generally have a large proportion of wealth invested in the firm. Private companies have therefore limited opportunities to diversify. Consequently, investors of private firms need compensation for the increased risk compared to investors of public firms (Damodaran 2012). Otherwise, investors would not be willing to invest in projects facing higher risks without a higher compensation, but may rather invest in other projects with less risk.

The total unlevered beta for PS Partner indicates the risk exposure without leverage. Beta-values larger than 1 ($\beta > 1$) imply a stock more sensitive to market movements than the market portfolio. Hence, the stock is exposed to a larger risk than the average market portfolio. Beta-values lower than 1 ($\beta < 1$) imply a stock with less risk than the market portfolio. For companies with $\beta < 1$ the investors can expect less return on equity compared to the market portfolio. Stocks not affected by market movements are associated with beta-values of zero ($\beta = 0$). Hence, investors should only be compensated for by the risk-free rate.

The correlation between the return of a company and that of the market ($\varrho_{i,m}$) was calculated according to:

$$\rho_{i,m} = \frac{COV\ (R_i, R_m)}{\sigma_i * \sigma_m}$$
Equation 4

σ_i = Standard deviation for the return of company i.

σ_m = Standard deviation for the return of the market.

R_i = Return of the public companies in the sample.

R_m = Return of the market.

The covariance (cov (R_i, R_m); equation 5) indicates how the return of the public companies in our sample varies with the return of the market during the investigated period 2011 to 2016. The market was defined as the return of OMXS30 (NASDAQ 2016).

$$COV(R_i, R_m) = \frac{\sum_{i=1}^{n}(R_i - \bar{R}_i)(R_m - \bar{R}_m)}{n-1}$$
Equation 5

$\bar{\bar{R}}_i$ = Average returns of the companies in the sample.
$\bar{R}_m$ = Average return of the market.

The standard deviation (σ; equation 6) is a measure of the spread around the average return.

$$\sigma = \sqrt{\frac{\sum_{n=1}^{n}(R_i - \bar{\bar{R}}_i)^2}{n-1}}$$
Equation 6

3.4 Bottom-up beta

Overall there are three main estimates of the systematic risk, ß: accounting beta, fundamental beta and bottom-up beta (Damodaran 2012). The bottom-up beta has been considered to provide the most accurate estimations and the lowest standard errors of the systematic risk (Damodaran 2012) and was therefore used in the present study. The total levered betas (ß$_{TL}$) with different debt levels were calculated as bottom-up betas using equation 7.

$$\beta_{TL} = \beta_{TU} * \left[1 + (1 - T_c) * \left(\frac{D}{V}\right)\right]$$
Equation 7

$\frac{D}{V}$ = Different debt − value ratios.

3.5 Capital asset pricing model

The capital asset pricing model (CAPM, equation 8) was developed by Sharpe (1964), Lintner (1965) and Mossin (1966). According to the model, the required rate of return for equity holders is a linear function of the risk free rate of interest, the systematic risk of the investment and the market risk premium. In CAPM, investors are compensated in two ways, the time value of money and the systematic risk. The risk-free rate represents the time value of money provided compensation of all investors for any investment over a period of time. Moreover, investors will be progressively compensated for with increasing risk against the market. However, the model does not compensate for the idiosyncratic risk, also called the unsystematic risk (Markowitz 1952). In CAPM the investors are assumed to be marginal investors fully diversified in their portfolio of investments. If the expected return is lower than the required return, investments should not be initiated.

CAPM relates to theories of the modern portfolio (Markowitz 1952). Important principles include that companies can diversify the systematic risk by taking on different projects that correlate with each other. This explains why CAPM is a function of the systematic risk and the premium of market risk. Since the risk-free rate is unaffected by investors, a higher return of investments is obtained by taking on a higher systematic risk.

The CAPM can generally be described as:

$$CAPM = r_E = r_f + \beta_{TL}(r_m - r_f) \qquad\qquad \text{Equation 8}$$

r_e = Required return on equity

r_f = Risk-free rate. The risk-free rate was in this study estimated from the average of a five-year Swedish government bond (SE GVB 5Y) from 2011 to 2015 (Riksbanken 2016).

The difference between the return of the market and the risk free rate $(r_m - r_f)$ represents the market risk premium. Total unlevered beta-values (β_{Tu}) represent the systematic risk investors of private companies are exposed to at no leverage and equals β_{TL} without leverage. Since β_{TL} is larger than β_{TU}, β_{TL} will provide a higher return on equity. Further, as debt is associated with an increased risk for financial distress the equity holders must be compensated for this increased risk (Damodaran 2012).

M. Hulth and S. Börjesson

3.6 Cost of debt

In a general sense, cost of debt is the interest rate at which our partner company PS Partner can borrow money at the financial market. Since PS Partner has no long-term debt, a benchmark was made against the sample of private companies (appendix table A5) to estimate a synthetic cost of debt that will represent the interest rate for PS Partner. Damodaran (2012) implied that the cost of debt for a private company tends to approach the average cost of debt for the industry, in this case the sample that was assumed to represent the industry.

Schwartz and Aronson (1967) found a relationship between type of industrial sector and the capital structure. Further, similar-sized industries from the same industrial sector display similar ratios of leverage and are relatively stable over time (e.g. Bowen et al. 1982; Bradley et al. 1984; Long and Malitz 1985; Kester 1986; summarized in Harris and Raviv 1991). Based on these observations, a benchmark against companies from the same industrial sector as that of PS Partner was implemented.

The cost of debt (r_d) is a function of a default spread based on the synthetic credit rating and the risk-free rate (Damodaran 2015, equation 9). A synthetic credit rating was estimated from the interest coverage ratio (i_{cr}) for the selected companies (equation 10) which also represents the synthetic credit rating based on table A5 in the appendix (Damodaran 2015).

$$r_d = \text{Default spread} + r_f \qquad \text{Equation 9}$$

$$i_{cr} = \frac{\text{EBIT}}{\text{Interest expenses}} \qquad \text{Equation 10}$$

EBIT = Earnings before interest and taxes. Values of EBIT were collected from the annual reports of the private firms (Table 2).

3.7 Weighted average cost of capital

The weighted average cost of capital (WACC, equation 11) is the rate the company on average is expected to pay to the security holders when financing a project or other investments. The model is often used with two types of securities, equity and debt, to reveal how these correlate and affect the expected average cost of capital. From the perspective of an investor, WACC can be interpreted as the minimum return an investment must generate for break-even. As mentioned above, different types of securities have different required returns. When calculating WACC, a key factor is to identify the relative weights or proportion each security has in relation to the total capital structure of the firm.

The weights of debt and equity used to estimate WACC should be based on market values (Fernandes 2014). However, calculations used in this study were based on ratios between debt and equity to avoid the problems of market values. WACC was calculated: i) with taxes, ii) without taxes iii) with costs for financial distress in order to study how the cost of capital changes with leverage (equation 11).

$$WACC = \frac{D}{(E+D)} * r_d * (1 - T_c) + \frac{E}{(E+D)} * r_e \qquad \text{Equation 11}$$

3.8 Modigliani & Miller

3.8.1 Proposition 1

Modigliani and Miller (1958) described how the capital structure of companies affects the cost of capital and hence the value of companies. The study by Modigliani and Miller (1958) has been widely cited and further tested by other researchers. It is generally considered as the first general accepted theory within capital structure (e.g. Luigi and Sorin 2011). In a perfect capital market (i.e. no information asymmetry, no transaction costs and no taxes), the capital structure does not affect the total value of a firm (Modigliani and Miller 1958). Thus, under these conditions, the levered value equals the unlevered value of a company. According to Modigliani and Miller (1958), the total cash flows are still equal the cash flows in company projects because the combined values must equal the total value of the firm (the law of one price). Thus, in a perfect capital market, the market value of the firm equals the total cash flows generated by the firm. Therefore, the market value is not affected by the capital structure of the firm (Modigliani and Miller 1958).

3.8.2 Proposition 2

Considering that different securities have different costs of capital, Modigliani and Miller (1958) studied how WACC was affected by increasing the leverage in a firm. Debt holders require a lower rate of return on the investment compared to shareholder due to the higher risk of equity holders. Because of this, the required return on equity will increase with leverage. According to Modigliani and Miller (1958) the required return on equity increases with increasing debt, while the weighted average cost of capital remains unchanged.

The theory by Modigliani and Miller (1958) has been challenged (e.g. by Durand 1959). Also, Modigliani & Miller (1963) illustrated how corporate income taxes may increase the value of a company and that companies should aim for the maximum feasible rate of leverage. This theory was later criticized for abandoning the risk factor and the presence of uncertainty (e.g. Baxter 1967; Gordon 1989). Bradley et al. (1984), discussed the existence of a downside of debt that must be considered. These authors argued that the optimal capital structure is not observed at the maximum feasible rate of leverage but rather by balancing the gain of leverage against the cost of bankruptcy and agency.

3.9 Trade off- theory

According to Modigliani and Miller (1963) there are only benefits with debt but the risk of financial distress needs to be considered. The trade-off theory (Kraus and Litzenberger 1973) is a modification of Modigliani and Miller (1963). It relies on the trade-off between the advantage of taking on leverage when gaining the present value of the tax shield, against the cost for financial distress. The model considers a balance between the costs of financial distress and agency and the tax savings gained by taking on debt.

Thus, the trade-off theory describes the fraction of debt and equity a firm should use as their optimal capital structure to maximize the value of the firm. The market value of the firm increases up to a certain debt level before the marginal cost of financial distress is higher than the marginal benefit of the tax shield. In principle, a company should increase debt until the marginal benefit equals the marginal cost. When the optimal capital structure is found, the market value of the firm is maximized (Kraus & Litzenberger 1973).

M. Hulth and S. Börjesson

There are two types of costs associated with bankruptcy, direct and indirect costs. Indirect costs are often difficult to quantify but are, in general, larger than direct costs (Berk & Demarzo 2012). The present value of costs related to financial distress typically depend on three different factors; i) probability of financial distress, ii) magnitude of costs associated with financial distress, iii) discount rate for costs related to financial distress (Berk & DeMarzo 2012).

The trade-off theory is widely used (e.g. Almeida & Philippon 2007; Mukherjee and Mahakud 2012; Amaya et al. 2015). Almeida and Philippon (2007) studied how different credit rating affects the value of the firm. These authors found that the value of the firm will increase at a maximum of approximately 4% at the optimal leverage ratio and equals credit rating A. Credit rating A typically corresponds to a leverage ratio of 22%- 28% (Molina 2005).

In this study, the trade-off theory was calculated by benchmarking towards SJR Scandinavia AB, a public company similar to PS Partner with a low book-value of equity and no long-term debt. The benchmark was made because several variables such as capital spending, market price per share and number of shares outstanding were not available for a private firm. An adjusted tax rate (T_a) was calculated for different ratios of leverage (equation 12; Damodaran 2015). The adjusted tax rate decreases with increasing ratios of leverage. At high ratios of leverage, interest expenses are higher than EBIT and, hence, a lower tax rate is paid. According to the adjusted tax rates, the beta-values for different ratios of leverage (equation 7) can be estimated and used to calculate the cost of equity (equation 8). The adjusted cost of debt (r_d) was estimated (equation 13) based on a likely credit rating for different ratios of leverage.

$$T_a = T_c * Min\,[1; (i + i_T)/i] \qquad\qquad \text{Equation 12}$$

i= Interest expense.
i_T= Taxable income= EBIT-interest expense.

Adjusted cost of debt due to applied taxes was calculated according to Damodaran (2015):

$$r_d = \text{Pretax } r_d *(1\text{-}T_c)$$
<div align="right">Equation 13</div>

Pretax r_d= the cost of debt dependent on which credit rating the firm can assume at different leverage ratios.

The costs of debt and equity for different ratios of leverage were used to estimate WACC (equation 11). Furthermore, these estimated capital costs for different debt levels were used to find the optimal capital structure (Damodaran 2015).

3.10 Value of the firm

To estimate the value of a private company involves assumptions and several benchmarks, especially due to the limited information publically available. However, EBIT and the corporate tax rate were available and the cost of capital was estimated as explained above. To estimate the value of a private firm (V_P) equation 14 was used, discounted by WACC with cost of debt included to find which capital structure that maximized the value of the firm.

$$V_P = \frac{\text{EBIT} * (1-\text{T}_c)}{\text{WACC}}$$
<div align="right">Equation 14</div>

4. Results

Results from the study include the cost of capital for the cost of equity and the cost of debt. Additional results are the value of the firm at the optimal capital structure according to the trade-off theory.

4.1 Cost of capital

In the sample of public companies (appendix, table A3) the average beta ($\bar{\bar{\beta}}_j$; equation 1) was 1,06 and the unlevered beta with leverage excluded (β_U; equation 2) was 0,89. The covariance ($COV(R_i, R_m)$; equation 5), i.e. how the market returns varied with the stock returns, was 0,57. The standard deviation (σ; equation 6) measured the spread around the mean return for the companies and for the market equaled 21,2% for the companies and 9,80% for the market.

The correlation coefficient ($\rho_{i,m}$, equation 4) , i.e. the linear relation between the market return and the companies return, was 0,28. The total unlevered beta (β_{TU}, equation 3), an adjustment of the unlevered beta to compensate for non-diversification, was 3,22. The risk premium of the market, i.e. the extra return of the market above the risk-free rate, was 3,25%. The required return on equity without leverage in the firm (estimated from CAPM) was 11,69% and the excess return above the risk-free rate was 10,47%. The average ratio of interest coverage for private firms was 3,27 and generated a synthetic credit rating of BB that corresponded to a default spread of 4.25% (Table A6). By adding the risk-free rate of 1,22% the cost of debt for the firm was estimated to 5,47% at the current capital structure.

According to Figure 1, the weighted average cost of capital (WACC, equation 11) without leverage equaled 11,69%. At the optimal capital structure including 30% leverage, the calculated cost of equity (r_e, equation 8) was 15,19% and the bottom-up beta (β_{TL}, equation 7) was 4,29. WACC with taxes was calculated (equation 11) to 9.46% when only the benefit of tax was included (Modigliani and Miller 1963). Similarly, WACC was 11,07% when the downside of debt was included in accordance with the trade-off theory (Kraus & Litzenberger 1973). At the extreme case of 70% debt, the cost of equity (r_e, equation 8) was 30,75% and the bottom-up beta (β_{TL}, equation 7) was 9,08. Under these circumstances, WACC with taxes was calculated to 6,49%.

Further, when the downside of debt was included, WACC equaled 25,74%. Figure 2 highlights the difference between the cost of equity for private firms and that of public firms. The cost of equity increased linearly to ≈70% debt for the private firm and to 80% debt for the public firm. At higher debt levels, the cost of equity increased exponentially.

Figure 1. Different costs of capital as a function of different leverage ratios (from 0-90% debt). The figure is based on the results from Table A1, appendix.
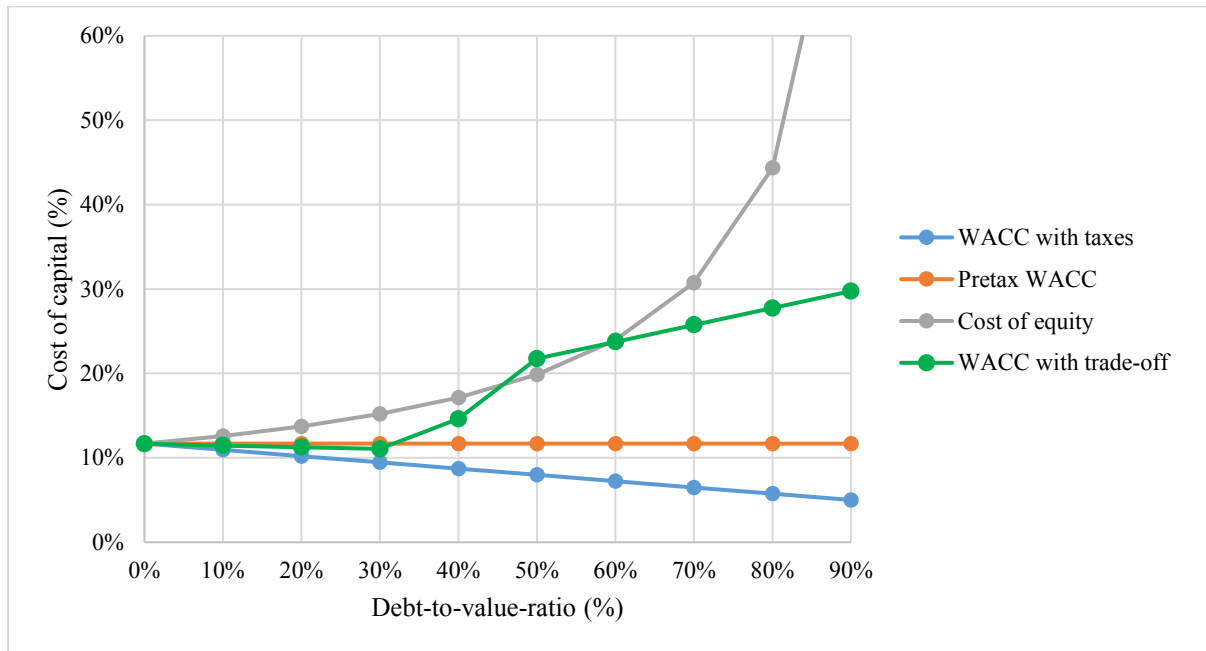

Figure 2. A comparison of the cost of equity for the firm PS Partner and the private companies in the sample as a function of different ratios of leverage.
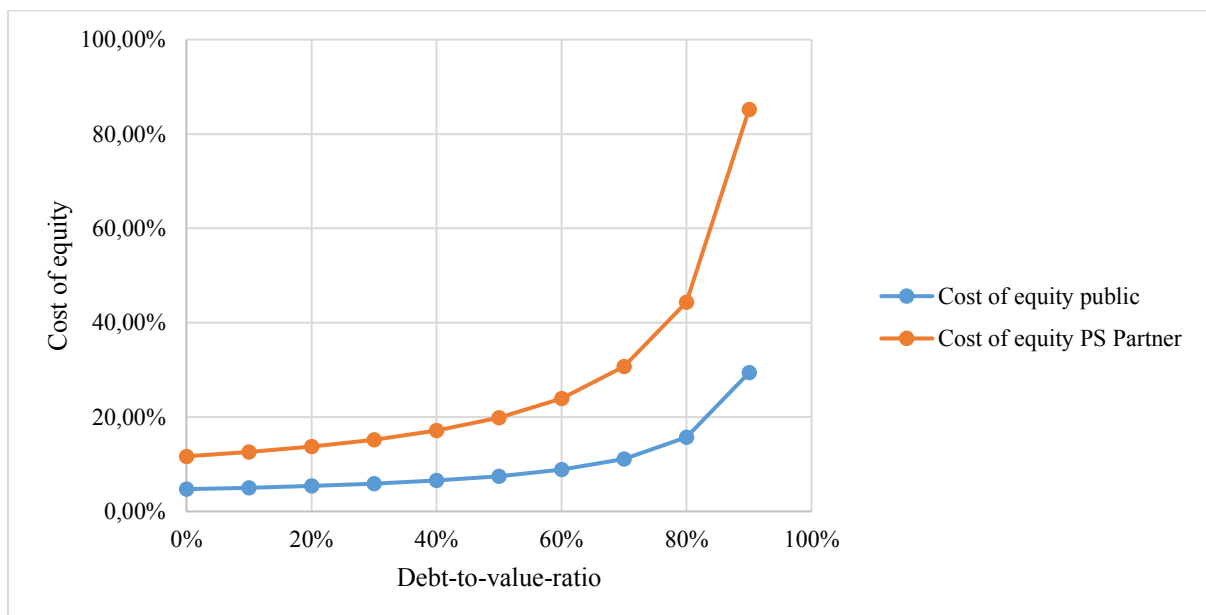
4.2 Value of the firm

In order to find the optimal capital structure that maximized the value of PS Partner, (V_P, equation 14) was calculated. The unlevered value was estimated to 19,4 MSEK. Modigliani and Miller (1963) introduced that the value of a firm increases as a linear function when only the benefit of debt is included. Such scenario can be illustrated in Figure 3. The tax shield increased the value of PS Partner by 430 000 SEK for every 10% increase in leverage (Figure 4).

When adding the cost of distress, the market value of the firm is maximized when the marginal tax benefit equals the marginal cost of distress (Kraus & Litzenberger 1973). The optimal capital structure of PS Partner corresponded to a debt level of 30% (Figure 3). At this level of debt, the market value was maximized at 20,4 MSEK.

Figure 3. Different market values of PS Partner for different ratios of leverage (from 0-90%). The figure is based on the results from Table A2, appendix.
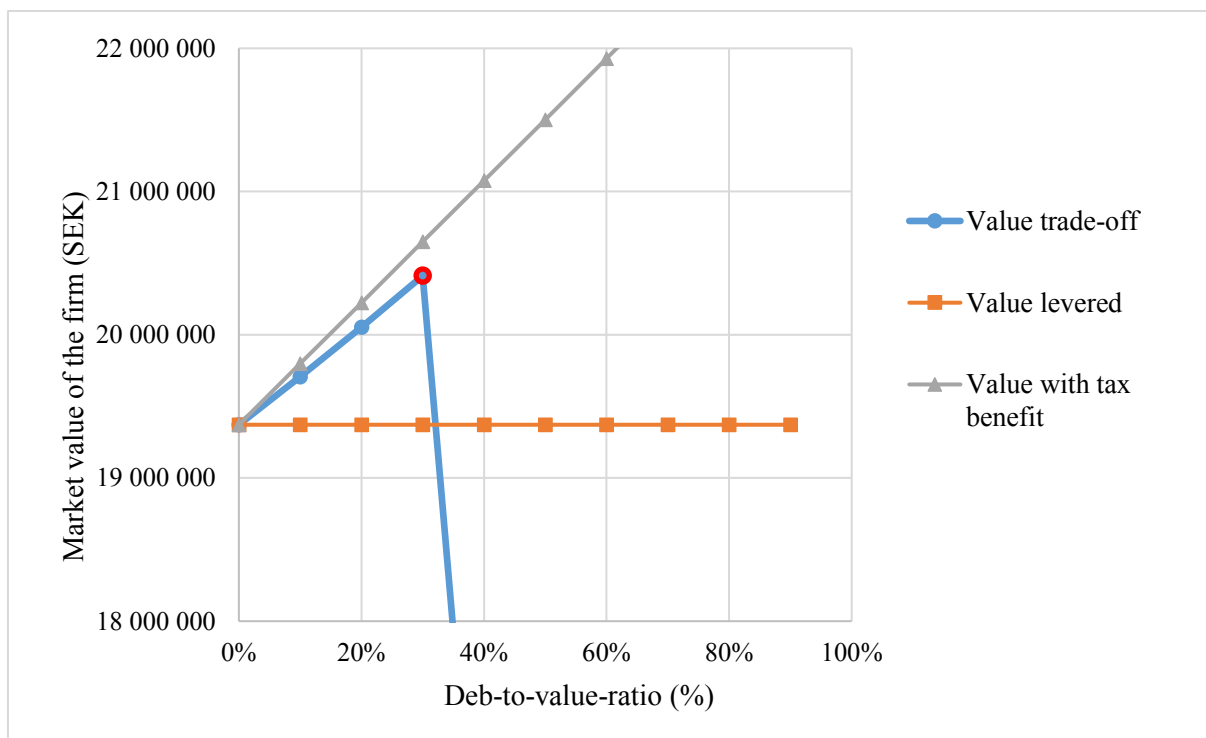
5. Discussion

In this chapter we discuss our results in accordance with the capital structure theory and in comparison with previous studies.

5.1 Cost of capital

5.1.1 Cost of equity

The unlevered beta-value (β_U) was 0,89, i.e. lower than the market beta-value ($\bar{\bar{\beta}}_j$) of 1. A lower unlevered beta-value than the market beta-value indicated that investors are exposed to a lower risk compared to that of the market. Investors could therefore experience a lower return on equity. However, the unlevered beta was designed for and mainly applicable for an unlevered public company (Damodaran 2012). In contrast, PS Partner is a private company and the beta-value need adjustments for non-diversification (Damodaran 2012).

The total unlevered beta (β_{TU}, equation 3) for PS Partner was estimated to 3,22. This beta-value was considered applicable for the current business of PS Partner as it does not have leverage (Damodaran 2012). The investors of the company should require a rate of return of 11,69% for future investments under the presumption that the risk and the capital structure remains unchanged (Table A1). In comparison, the highest beta-value in the sample of public companies was found for NetJobs Group AB (3,43 compared to the total unlevered beta of 3.22 for the private company PS Partner). However, this beta included leverage and according to Damodaran (2012) such beta-values are normally higher than beta-values without leverage. To facilitate comparison, beta-values for private companies and public firms must include the same amount of leverage.

As the optimal capital structure corresponds to 30% leverage (Figure 3) we have investigated how the risk and the required return on equity varied at this optimal rate of leverage. The optimal capital structure corresponded to a total levered beta (β_{TL}) of 4,29, which represented a required return on equity of 15,19% (Table A1). The required return on equity increased by 3,5 % compared to if the firm would have remained unlevered (Figure 2). A required return on equity of 15,19% would therefore correspond to the minimum return investors would have demanded for future investments at a constant risk level.

In model calculations, the beta-value was only adjusted for non-diversification (equation 3). However, there are additional differences between public and private companies that affect model estimations. For example, private companies are exposed to higher asymmetric information (e.g. Myers and Majluf 1984) and higher risk of liquidity (e.g. Brav 2009). The risk of liquidity appears when assets of a private company are less liquid and more difficult to trade on the financial market. Private companies are therefore normally more sensitive to the general performance, which affects the liquidity of the company (e.g. Brav 2009). Due to the information asymmetry, outsiders of private companies have access to less information about the firm than outsiders of public firms. Because of this, investors are normally only willing to invest at a discounted price (Myers and Majluf 1984).

Thus, if the risk of liquidity and the information asymmetry would have been included in the adjustment made for non-diversification (Damodaran 2012, equation 3), the beta-value would have been even higher. With a higher beta, the cost of equity would also have been higher. This scenario indicated that the estimated cost of equity without leverage (11,69%) and the cost of equity (optimum value of 15,19%) were underestimations of true values.

The required return on equity was almost linear up to about 70% leverage (Figure 2). At higher ratios of leverage, the cost of equity increased exponentially. Since PS Partner is a small private company it is sensitive to the performance and interest expenses of the company. Thus, shareholders of private firms are exposed to a higher risk for financial distress compared to investors of public firms.

A sensitivity analysis was established to study the cost of equity for the private company PS Partner in relation to the sample of public companies (Figure 2). The cost of equity increased exponentially at about 70% leverage for PS Partner but at about 80% leverage for the public companies (Figure 2). This difference was interpreted as the level when the investors of private and public companies experience the risk of financial distress as significant and require additional compensation for every unit increase of leverage. The exponential increase appeared at about 10 % higher leverage for the public firms compared to the private firm (Figure 2). PS Partner is a privately held company in which investors are exposed to a higher risk than in public firms. This increased risk was illustrated by a higher beta. Further, the difference may have been even larger if the information asymmetry and the liquidity risk would have been included in the adjusted beta.

5.1.2 Cost of debt

The cost of debt (r_d, equation 9) represents the synthetic interest rate used for PS Partner and was estimated to 5,47%. The interest rate is normally constant up to a certain value until the risk of financial distress increases and the creditors require compensation for this risk (Berk & DeMarzo 2013). The cost of debt is normally less risky compared to the cost of equity, because creditors are granted money before the equity holders and it is therefore a lower capital cost. However, PS Partner is a small company with a low fraction of fixed assets (3,9% of the total assets of the firm). With limited fixed assets, banks have difficulties to obtain securities in the company and therefore often require additional compensation through higher interest rates, compared to companies with a larger fraction of fixed assets.

5.1.3 Weighted average cost of capital

Higher ratios of leverage increase the cost of equity due to higher costs for financial distress (Kraus & Litzenberger 1973). However, in a perfect capital market, the net effects of WACC without taxes remain constant, depicted as the pretax WACC (Modigliani & Miller 1958). In this study, the WACC without leverage equaled 11,69% (Table A1). The weighted average cost of capital with taxes decreased linearly with leverage due to the tax shield (Modigliani and Millers 1963). This was however not the case for PS Partner due to the presence of increased risk for financial distress associated with higher leverage ratios. WACC with downside of debt included in the model decreased up to about 30% debt after which WACC increased because the marginal cost of distress was higher than the benefit of the tax shield. At a ratio of leverage of about 30%, interest payments were still lower than the EBIT from which they were deducted. Increasing the leverage ratio above 30% did not gain any benefit from a marginal tax shield. WACC was thus minimized at a ratio of leverage of about 30%, which corresponded to a WACC of 11,07%. Accordingly, at debt levels above about 30% interest expenses were higher than EBIT, whereas the tax shield was already maximized.

WACC with downside of debt was U-shaped until about 50% debt after which WACC increased in a linear function (Figure 1). At ratios of leverage above 50%, the maximum cost of debt was used because the lowest credit rating D was assumed (Appendix, Table A6). Credit rating D is generally known as a certain point to reach financial distress.

5.2 Optimal capital structure

According to the trade–off theory (Kraus & Litzenberger 1973), the optimal capital structure for PS Partner represented a ratio of leverage of about 30% (Figure 3). With increasing debt levels, the value of the firm decreased because the marginal costs of debt were higher than the marginal benefit of debt (Figure 3, Berk & Demarzo 2012). The optimal ratio of leverage of about 30 % is in accordance with e.g. Almeida and Philippon (2007). Further, Amaya et. al (2015) observed an optimal ratio of leverage of approximately 40%. The ratio of leverage was lower in the present study probably because Amaya et. al (2015) focused on the manufacturing industrial sector. The manufacturing industry is normally associated with a larger fraction of fixed assets such as machines and instrumentation and is therefore more liquid than companies that rely mainly on human resources. Companies with a lower fraction of fixed assets are normally associated with lower values of debt in their optimal capital structure because they have higher borrowing rates due to a higher risk for the creditors.

5.3 Value of the firm

At ratios of leverage larger than about 30 % the market value will decrease exponentially due to high marginal costs of financial distress (Figure 3, Kraus & Litzenberger 1973). Creditors may require higher expenses for interest due to higher levels of debt. Problems may arise to access an external capital market and customers and suppliers may also demand stricter policies which will affect the company negatively.

With the optimal capital structure, the market value of the company increased by approximately 5,4% due to increasing leverage of the company (Table A2). In accordance with the present study, Almeida and Philippon (2012) concluded that the value of a public company can increase by approximately 4 % at the optimal capital structure. Our results confirmed observations in Amaya et al. (2015) that firms do not take full advantage of a tax shield since they currently have no leverage whereas the optimum corresponds to 30% leverage. Taxes provide an important aspect that may affect the cost of capital for companies (Kraus & Litzenberger 1973). The corporate tax rate directly affects the tax shield derived from debt (Modigliani & Miller 1963). At higher tax rates, companies will face higher benefits from a tax shield. Assuming that PS Partner would be active in a country with higher tax brackets, e.g. with 35% corporate tax, the cost of capital would decrease by approximately 0,5 percentage points from the current estimated optimal cost of capital (11,08%).

6. Conclusions and future research

This section highlights the key findings of our study.

According to the trade-off theory, the optimal capital structure for the private company PS Partner would be to undertake about 30% debt. Such capital structure would generate a market value of approximately 20,4 million SEK, an increase of approximately 5,4% compared to the present value of the company. With this debt level the total levered beta would correspond to 4,29 with a required return on equity of 15,19%. This corresponds to an increase of 3,5 % for the required return on equity due to the higher risk associated with debt. The total levered beta for the private company was significantly higher than for the sample of public companies. With the optimal capital structure, the cost of capital equaled 11,07%. This provided the lowest required return investors should demand for future investments at the same risk.

Total unlevered beta of the firm, adjusted for non-diversification, corresponded to 3,22. This beta was in the high end compared to beta-values of the public companies although not modified for leverage. The investors of the private firm should require a return on equity of 11,69% if the firm continues to be unlevered. Further, this rate should be used as the discount rate for future investment decisions that experience the same risk.

The required return on equity for the investors of the private firm increased in a linear trend up to 70% debt after which it increased exponentially. In contrast, the required return on equity for the public companies increased linearly up to about 80% debt after which it increased exponentially. The cost of debt was estimated to 5,47%, based on a synthetic credit rating. This value constitutes the cost for the company to raise funding from a financial market at the current capital structure.

Since a vast majority of all companies on the market are private it is important and highly relevant to study these types of firms more thoroughly. Interesting research questions include to study optimal capital structures for an entire industry of private companies on the Swedish market. These insights can highlight important aspects for investors of private firms to simplify the choices regarding capital structure and to find the optimal leverage ratio that will maximize the value of the firm.

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Appendix

Table A1. Different costs of capital for different ratios of leverage (from 0 to 90 % debt).

Debt (%)	Cost of equity (%)	Pretax WACC (%)	WACC with taxes (%)	WACC trade-off (%)
0	11,69	11,69	11,69	11,69
10	12,60	11,69	10,95	11,46
20	13,73	11,69	10,21	11,26
30	15,19	11,69	9,46	11,07
40	17,14	11,69	8,72	14,63
50	19,86	11,69	7,98	21,74
60	23,94	11,69	7,24	23,74
70	30,75	11,69	6,49	25,74
80	44,37	11,69	5,75	27,74
90	85,21	11,69	5,01	29,74

Table A2. Different market values of PS Partner for different ratios of leverage (from 0 to 90% debt).

Debt (%)	Value levered (SEK)	Value with tax benefit (SEK)	Value trade-off (SEK)
0	19 371 536	19 371 536	19 371 536
10	19 371 536	19 797 710	19 706 195
20	19 371 536	20 223 884	20 052 620
30	19 371 536	20 650 058	20 411 443
40	19 371 536	21 076 232	15 440 027
50	19 371 536	21 502 406	10 386 605
60	19 371 536	21 928 579	9 511 745
70	19 371 536	22 354 753	8 772 814
80	19 371 536	22 780 927	8 140 417
90	19 371 536	23 207 101	7 593 063

Table A3. Sample of public companies with variables used during modelling.

Companies	BTS Group AB	Intrum Justitia AB	NetJobs Group AB	Intellecta AB	Poolia AB	SJR In Scandinavia AB	Uniflex AB	WISE Group AB	Rejlers AB	Semcon AB	Average
Beta, Sample	0,56	0,59	3,43	0,77	0,67	1,08	0,51	1,37	0,76	0,83	1,06
Debt (TSEK)	153	5352000	263	41598	0	0	0	5342	110100	23100	
Equity (TSEK)	434505	2948000	10537	177569	67833	49371	83104	99179	441400	662500	
Return 2011 (%)	-19,49	8,07	34,12	-25,94	-65,61	-10,38	-8,94	108,16	-2,69	-18,37	-0,11
Return 2012 (%)	36,63	-5,80	24,29	-16,88	-21,62	15,16	11,39	51,55	18,70	100,00	21,34
Return 2013 (%)	-0,82	90,72	-24,68	72,76	6,07	39,28	10,61	-2,88	37,86	30,21	25,91
Return 2014 (%)	3,81	32,08	-56,61	-12,02	-2,20	59,47	-37,88	-12,80	-1,60	-14,21	-4,20
Return 2015 (%)	33,19	27,41	277,48	16,34	11,71	18,31%	17,13	154,72	24,44	-9,11	57,16
Return 2016 (%)	-6,45	-0,76	-11,27	4,06	8,87	2,65	0,00	-11,54	-10,23	-8,25	-3,29
Average stock return (%)	7,81	25,29	40,56	6,39	-10,46	20,75	-1,28	47,87	11,08	13,38	16,14
Return 2011 OMXS30 (%)											-14,51
Return 2012 OMXS30 (%)											11,83
Return 2013 OMXS30 (%)											20,66
Return 2014OMXS30 (%)											9,87
Return 2015OMXS30 (%)											-1,16
Return 2016OMXS30(%)											0,14
Return average OMXS30 (%)											4,47
Covariance	0,04	0,02	0,24	0,04	0,03	0,00	0,04	0,11	0,03	0,02	0,57
Variance Stocks	0,05	0,13	1,46	0,13	0,09	0,06	0,04	0,50	0,04	0,21	0,04
Variance market											0,01
STDS Stocks (%)											21,2
STDS Market (%)											9,76

M. Hulth and S. Börjesson

Table A4. Summary of variables.

STD S stocks	21,20%
STD Market	9,76%
Covariance	0,57
Risk-free rate	1,22%
Market return	4,47%
Total unlevered beta	3,218
Correlation coefficient	0,28
Required return of equity with no debt	11,69%

Table A5. The sample of the private companies shown with EBIT, interest expenses and interest coverage ratios used to calculate a synthetic borrowing rate.

Company name	EBIT (SEK)	Interest expense (SEK)	Interest coverage ratio
Alingsås Företagsservice AB	2069080	186173	11,114
Asken Finans AB	5749313	1481095	3,882
Claes Erik Lundgren AB	293133	471594	0,622
Esstvätt AB	391286	121100	3,231
God Service i Sverige AB	433586	124836	3,473
Loop i Sundsvall AB	22874	28113	0,814
Musikevent Hoxell AB	447000	28000	15,964
Next U AB	92036	27260	3,376
Österlenrevision AB	675821	67974	9,942
Sprint Dalarna AB	55958	38330	1,460
Vic Självkem i Visby AB	684676	234682	2,917
Vic Textiltvätt Aktiebolag	967804	342086	2,829
Yrkeskonsult i Sundsvall AB	748855	71046	10,540
Zeventy AB	279090	81531	3,423
Average	**Credit rating**	**Default spread**	**Borrowing rate**
3,27	BB	0,0425	5,47%

M. Hulth and S. Börjesson

Table A6. Interest coverage ratios used to calculate the cost of debt for smaller firms exposed to a larger risk. Damodaran (2012)

If interest coverage ratio is greater than	≤ to	Rating is	Spread is
-100000	0,499999	D2/D	20,00%
0,5	0,799999	C2/C	16,00%
0,8	1,249999	Ca2/CC	12,00%
1,25	1,499999	Caa/CCC	9,00%
1,5	1,999999	B3/B-	7,50%
2	2,499999	B2/B	6,50%
2,5	2,999999	B1/B+	5,50%
3	3,499999	Ba2/BB	4,25%
3,5	3,9999999	Ba1/BB+	3,25%
4	4,499999	Baa2/BBB	2,25%
4,5	5,999999	A3/A-	1,75%
6	7,499999	A2/A	1,25%
7,5	9,499999	A1/A+	1,10%
9,5	12,499999	Aa2/AA	1,00%
12,5	100000	Aaa/AAA	0,75%