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Equity valuation and the incorporation of investment risk: insights from sell-side analysts

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Abstract

This thesis explores how sell-side equity analysts incorporate investment risk into their valuations and analyses of common stocks. Interviews have been conducted with 20 Swedish analysts from 13 different institutions with the intention of gaining a deeper understanding of their behavior and thought processes. We find that many analysts regard risk as an implicit and embedded part of their holistic view on companies and stocks. From this follows that they rely extensively on qualitative subjective judgment and experience, rather than quantification when assessing risk factors. In addition, the study shows that in line with previous research, many analysts use the CAPM (Sharpe, 1964; Lintner, 1965) for calculating the explicit cost of equity capital. However, they apply the model without deeper reflection and the determination of the input factors is characterized by *approximation* rather than *estimation*. In distinction to previous research, we further find that a few analysts use proprietary models based on fundamental risk factors for calculating the cost of equity capital. These models rely extensively on accounting information for determining input factors, the relevance of which has been discussed in Nekrasov & Shroff (2009). However, the proprietary models may also incorporate more qualitative risk factors such as quality of management.

Key words: Investment risk, Sell-side equity analysts, Equity Valuation, Analyst behavior

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1 Introduction

> "*In a world of uncertainty, the desirability of an investment depends not only on the expected payoff, but also on the risk of the future payoffs. For that reason, in addition to forecasting the levels of future cash flows, earnings, or stock prices and providing stock recommendations, financial analysts often provide information about investment risk.*"
>
> (Lui et al, 2007, p.630)

This thesis examines how sell-side equity analysts (sometimes simply referred to as analysts for the remainder of the thesis) incorporate investment risk into valuations and analyses. Sell-side equity analysts have drawn attention both in the academic world and in the business press for a long time due to their role as information providers and their influence on the expectations and behavior of investors (Schipper, 1991; Stickel, 1995). Previous research has revealed that analysts' earnings forecasts, stock recommendations and written arguments are value relevant independently of each other (Francis & Soffer, 1997; Asquith et al, 2005; Womack, 1996), implying that they influence stock prices. Thereby research on equity analysts' behavior is an extensive field within accounting research and covers topics such as information sources, valuation models and institutional context. However, the research environment has been criticized for being narrow in scope, leading to the development of a domain within accounting research known as the "black box" of equity analysts' behavior. In particular, there has been a lack of attention given to the processes and practices of how analysts translate information into valuations and stock recommendations (Schipper, 1991; Bradshaw, 2011), which prevents a more thorough understanding of their behavior.

Previous empirical research has shown that equity analysts contribute with information on investment risk both by aggregating existing information and by creating new information (Lui et al, 2007). Furthermore, institutional investors have been found to increase their reliance on sell-side equity analysts when facing uncertainty (Hellman, 2000, p.205-206). However, despite their role as information providers on risk, previous behavioral studies on analysts do not explicitly investigate their risk assessments and risk analysis. The existing research on how analysts handle and convey information about investment risk is instead quantitative in nature and largely based on archival data. However, Joos et al (2016) find that

analysts' reports often do not include formal risk assessments, implying that investment risk is rather an embedded part of the analysis. Thereby, the risk assessments are difficult to interpret using quantitative studies (see Peasnell et al, 2018, p.226), highlighting the need for qualitative research that investigates the underlying thought processes and more subtle reasoning of the analysts. Consequently, the purpose of this thesis is to shed light on how sell-side equity analysts handle investment risk and how it is incorporated into valuations and recommendations. Thus, our research is based on the following research question:

- How do sell-side equity analysts handle investment risk in their analysis and valuation of common stocks?

In this thesis, investment risk is defined as the risk of receiving a return different from the expected. In an inefficient stock market, the investment risk is derived from both fundamental risk and valuation-risk (Penman, 2013, p.661). Fundamental risk refers to the uncertainty in future outcomes in business performance that drive the *intrinsic value*[1] of a company. Events and uncertainties that cause a stock's price to deviate from the intrinsic value are referred to as valuation-risk.

The data for this study has been collected through semi-structured interviews implying that the more embedded and subtle parts of analysts' risk assessments can be captured. Through the means of open-ended interview questions, we gain a deeper understanding of the analysts' behavior. Our empirical data consists of interviews with 20 Swedish sell-side equity analysts from 13 different institutions in the Stockholm area. To broaden the sample, we have included a wide range of analysts in terms of their industry coverage, the size of the companies they follow and their experience.

Our findings contribute to the existing research environment in the following ways. Firstly, we find that there is a perception among sell-side analysts that investment risk is an embedded part of the analysis and stock-valuation, meaning that it is an inseparable part of their holistic view of a company. In relation to this, many analysts prefer to rely on subjective judgment that is based on their experience and deeper knowledge of companies and industries, instead

[1] Defined in Penman (2013, p.4) as: *The worth of an investment that is justified by the information about its payoffs.*

of quantifying explicit risk factors. Thereby, they rather evaluate investment risk qualitatively and, instead of calculating specific valuation-scenarios, they value discussions with their clients on how certain outcomes and events can affect the value of a stock.

Our findings further indicate that most analysts use the DCF-model as a secondary valuation tool to multiple-valuations. Measuring investment risk explicitly through the cost of equity capital is therefore of limited importance to them. While they use the CAPM (Sharpe, 1964; Lintner, 1965), it is applied without deeper reflection and the estimation of the model's input factors is characterized by *approximation*. However, a minority of the analysts in our sample have the DCF-model as their primary valuation tool, but rather than using the CAPM, they rely on proprietary models for estimating the cost of equity capital. Instead of using historical returns, these models measure investment risk by quantifying fundamental risk factors. In line with research by Beaver et al (1970), Nekrasov & Shroff (2009) and Lyle et al (2013), accounting information is a key input component. However, in the context of small companies where financial information is perceived as a less reliable indicator of future performance, we find that a few analysts extensively incorporate qualitative information, and in particular management quality, when calculating the cost of equity capital.

2 Previous Research

The theoretical framework gives an overview of previous research relating to equity analysts and their behavior, with a specific emphasis on how investment risk is incorporated into analysis and valuation. The framework covers analysts' role on the capital markets and the information sources they use (2.1), their application and incorporation of risk in valuation models (2.2) and how they determine the cost of equity capital (2.3).

2.1 Analysts' role on the capital markets and their information sources

The first section of the theoretical framework starts with examining the role of sell-side equity analysts on the capital markets and how they convey information to investors. This is followed by an analysis of research covering the information sources that they use, both from a general perspective and with a specific focus on investment risk.

2.1.1 Analysts' influence on the pricing of stocks

The intrinsic value of a stock is the present value of all future dividends, and thereby a function of the cash flows that will flow to the stock's owner as well as the riskiness of those cash flows (Damodaran, 2013). The price of a stock on the other hand is rather a reflection of the market's expectation of these cash flows and the compensation that investors require for taking on that level of risk. The degree to which the quoted prices of stocks reflect their intrinsic value is a measure of the market's efficiency. The semi-strong efficient market hypothesis (Fama, 1970) stipulates that stock prices reflect all publicly available information and that excess returns only can be achieved through insider trading. This would imply that equity analysts don't provide any value to investors since they only rely on public information.

However, information must be gathered and processed to be reflected in prices, which is the role of the financial analyst (Schipper, 1991). Institutional investors use sell-side analysts' reports as input when forming a fundamental opinion about a stock (Hellman 2000, page 136; Imam & Spence, 2016; Barker, 1999). Earnings forecasts, stock recommendations and written arguments have been shown to be value-relevant independently of each other (Francis & Soffer, 1997; Asquith et al, 2005). Analysts are accordingly influential in pricing stocks and

their expectations and opinions influence the expectations of the aggregate market (Stickel, 1995; Asquith et al, 2005).

The topic of if analysts' superior analytical skills mean that they can "beat the market" and deliver abnormal returns has been extensively debated both in the business press as well as in academia. A study by Barber et al (2001) investigates if abnormal returns can be gained through an investment strategy based solely on analyst recommendations. The results show that, absent transaction costs, significant excess returns can be gained by following the analysts' advice. Similarly, Womack (1996) studies stock price reactions to analyst recommendations and finds that the recommendations have significant and lasting effects on prices. He finds that analysts have an ability to both time the market in the sense that they make buy-recommendations (sell-recommendations) ahead of market upturns (downturns), and that they are capable of picking stocks that generate returns in excess of the market.

In his conclusions, Womack (1996) states that his research is supportive of the extended efficient market hypothesis laid forward by Grossman & Stiglitz (1980) in that markets cannot be efficient if information costs don't generate returns. Gatherers and processors of information require compensation for their work and if this is not accounted for, abnormal returns will be possible. In this context, analysts can be said to play a part in making markets more efficient by making sense of information that is public but needs to be processed and made understandable to truly be available for investors (see Foster, 1979).

2.1.2 The role of analysts as information providers on investment risk

While the research environment on equity analysts' earnings forecasts and recommendations is fairly extensive, research on their ability to assess investment risk and provide risk information to market participants is scarcer (Joos et al, 2016; Lui et al, 2012). However, in a quantitative study, Liu et al (2007) find that risk ratings provided by analysts add information about the future volatility of stock returns. On the same topic, Joos et al (2016) studies how well analysts at Morgan Stanley that have a scenario-based approach to valuation (where a bear-, bull- and base-case are used), convey information about investment risk. They find that when the spread between the analysts' valuation-scenarios is larger, the valuation error (measured from the base-case scenario) is also larger, implying that the analysts are providing risk information through the scenarios.

Liu et al (2012) find that analysts' risk ratings are value-relevant by showing that a change in rating has an incremental impact on 3-day returns. Analysts have also been shown to account for a risk/return trade-off, where stocks with a higher expected return also have higher risk ratings (Liu et al, 2012), and larger spreads in scenario-based valuations (Joos et al, 2016). Hellman (2000, p.205-206) finds that when facing uncertainty, institutional investors tend to rely more on external analysts' advice, in part because analysts are seen as a trustworthy source of information. Furthermore, while analysts' price forecasts are optimistically biased, their assessment of investment risk isn't, instead there is rather a skew towards higher risk ratings (Joos et al, 2016; Liu et al, 2012; Liu et al, 2007).

2.1.3 Information sources used by analysts

Having determined that many investors rely on sell-side analysts for making investment decisions, it becomes interesting to look at the information sources that the analysts themselves use. Previous research indicates that risk is a part of equity analysts' holistic view of companies (Barker, 1999; Imam & Spence, 2016) and can be perceived as uncertainty in factors that affect business performance (Barker, 1999). The implication of this is that the information sources used by analysts to assess investment risk often are no different from those that they use to evaluate companies on a more general basis. Thereby, while some of the studies presented below cover analysts' information sources from a more general perspective, they are relevant also in the context of investment risk.

Behavioral studies on sell-side equity analysts highlight the importance of information provided directly by the company that they are following, in the form of contact with management and financial statements (Barker, 1998; Barker, 1999; Graham et al, 2002). Imam & Spence (2016) emphasize the importance of analysts' proximity to company management by referring to their social capital in the form of connections and networks. Since sell-side analysts follow fewer companies than their buy-side clients, they can develop closer relations with and gain greater access to company management.

In a combined content-analysis and interview-study, Barker & Imam (2008) find that analysts base their forecasts and recommendations primarily on accounting information. Accounting information was found to be one of the top information sources for analysts also in Barker (1998), Barker (1999) and Graham et al (2002). When using financial statements, Graham et al (2002) and Hjelström et al (2014) find that analysts primarily are concerned with the

income statement, followed by the balance sheet. Graham et al (2002) hypothesizes that the cash flow statement is used primarily in conjunction with the income statement as an indicator of earnings quality, rather than being informative on its own. On the same note, Imam & Spence (2016) find that firms with core earnings sources that are backed up by a reliable business model are perceived as less risky by analysts.

In sum, the existing research environment indicates that company management and accounting information are the most important information sources to analysts. However, a study by Brown et al (2015) offers an alternative perspective. Using a combination of surveys and interviews, these researchers found that industry knowledge (such as understanding key trends and technology) is the most important input factor for analysts in making earnings forecasts and stock recommendations.

2.1.4 Analysts' information sources on investment risk

While there is extensive market-based research on how different risk factors correlate with required returns on the stock markets, research on the specific information sources that sell-side analysts use to assess risk and risk factors is scarcer (Peasnell et al, 2018; Joos et al, 2016; Lui et al 2012). However, the existing quantitative studies show that accounting information is important also in this aspect. Analysts look at accounting-based figures, such as Book-to-Market (B/M), financial leverage and earnings to come up with risk ratings (Lui et al, 2007) and to determine the spread between valuation-scenarios (Joos et al, 2016). Analysts also view size (the market value of shareholder equity) as a relevant indicator of risk, in part through the B/M-ratio, but also by using market capitalization as such as a risk factor, where small stocks are considered riskier (Joos et al, 2016). This is in line with the empirical results from Fama & French (1992) where B/M and market capitalization were determined to have explanatory value for predicting excess returns. Joos et al (2016) also find that stock price volatility, as measured by the CAPM-beta, are relevant for analysts' risk assessments, but the results from Lui et al (2007) are inconclusive on this regard. In that study idiosyncratic, or company-specific, risk was rather found to correlate with the analysts' risk assessments.

On a further note, an interview-study by Imam & Spence (2016) found that analysts only account for information that they believe will affect stock price performance when evaluating companies. In relation to this, Barker (1999) found that, in addition to fundamental factors, analysts also consider stocks' exposure to certain market risks (defined as valuation-risks in

this thesis). In particular, stock liquidity and market sentiments are mentioned as risk factors that affect the pricing of stocks. When analyzing information, analysts have to incorporate how other market participants will interpret that information since this will affect the stock's price development.

2.2 Valuation models and the incorporation of risk

This section is devoted to identifying, describing and analyzing the valuation models that are used by equity analysts and how they influence the way that investment risk is incorporated into valuations. The choice of valuation model influences how analysts assemble and analyze risk information, which motivates a review of how these models are applied. Basically, two broad types of valuation techniques are used, simple valuation models and more complex fundamental valuation models. They will each now be discussed in greater detail.

2.2.1 Simple valuation models

Unlike what is suggested by financial theory, several studies have identified simple valuation models, or valuations using multiples, as the primary tool for analysts' equity appraisals (Brown et al, 2015; Demirakos et al, 2004; Hellman, 2000; Barker, 1999; Arnold & Moizer, 1984). Simple valuation models compare the value of a company in the numerator (e.g. enterprise value or market capitalization) with a certain value driver in the denominator (e.g. net income, EBIT, operating cash flow or sales). To be consistent with valuation principles, value drivers are generally forward looking and based on estimates of future performance. Previous research indicates that value drivers primarily are extracted from companies' income statement, and in particular their earnings, rather than balance sheet (Barker, 1999; Pinto et al, 2015).

From equity analysts' point of view, simple valuation models are regarded as advantageous since only a limited amount of input factors are required, making them more practical to apply (Imam et al, 2008; Barker, 1999). This sheds light on the trade-off between simplicity and accuracy when choosing a valuation model. In a survey-based study on finance practitioners (primarily portfolio managers and financial analysts) with a focus on how they handle investment risk, Bancel & Mittoo (2014) found that difficulties related to determining an explicit cost of capital was perceived as the greatest limitation of fundamental models. Thereby, many practitioners preferred to rely on multiple-valuations since they allow for a more implicit incorporation of risk. Furthermore, the study indicates that multiple-valuations

are advantageous since they facilitate comparisons with other traded companies with similar risk characteristics.

In relation to this, equity analysts often base their valuation multiple on trading multiples of comparable companies (peers). A single peer may be used, or several to form an industry average, which has been shown to make multiple-valuations more relevant to analysts (Liu et al, 2002; Demirakos et al, 2010). Because of the high impact on valuations, selecting peers with similar fundamental characteristics is critical for this type of valuation. Therefore, Koller et al (2015, p.353) suggest that, in order to increase comparability and find more similar peers, a *sum-of-the-parts* approach can be applied. This valuation method breaks down a company into several subdivisions and assigns a multiple to each one, implying that it better matches the fundamentals of each part of the company.

Even though analysts' valuation multiples don't require an explicit risk measure, they have been found to capture risk information (Yin et al, 2014), meaning that firms with riskier future cash flows are assigned lower multiples and vice versa. Yin et al (2018) find that equity analysts retrieve information from three benchmarks to determine a valuation multiple, and that these inherently incorporate risk fundamentals into the valuation. These benchmarks are multiples of comparable firms, the market index multiple and the firm's historical multiple.

In line with the previous discussion, Yin et al (2018) argue that comparisons of peers' trading multiples can be used to analyze the relationship between fundamental factors, such as earnings growth, earnings volatility and financial leverage, and the market's valuation. Furthermore, the researchers argue that index comparisons yield a perspective about the market's expectations on the growth prospects of the economy as well as macroeconomic risk factors, such as interest rates. Lastly, the historical multiple shows how the firm has been valued historically. Comparing this with the present multiple can give an indication of shifts in market sentiments or shifts in the firm's fundamentals, if viewed in the light of current circumstances.

2.2.2 Fundamental valuation models

Analysts perceive fundamental valuation techniques as more complex to apply since they require multi-year forecasts and extensive estimations of input factors (Imam et al, 2008; Barker, 1999). Despite this, studies by Brown et al (2015), Imam et al (2008) and Demirakos

et al (2004) indicate an increasing prevalence of fundamental models during the last two decades. In these studies, the DCF-model and P/E-multiple were found to be equity analysts' primary valuation tools, which can be compared to older studies by Barker (1999) and Arnold & Moizer (1984), where several simple valuation models were perceived as more important than the DCF-model.

In the context of investment risk, fundamental valuation models differ from simple models in that risk is quantified and measured through an explicit cost of capital that is used as the discount factor for future cash flows. Thereby, their increasing prevalence implies that analysts to a greater extent have to explicitly estimate the cost of capital. For equity investors, the investment risk is captured by the cost of equity capital (see section 2.3). The cost of equity capital should reflect the compensation that investors require for investing in stocks, given the level of uncertainty in their expected returns.

2.2.2.1 The Dividend Discount Model

The Dividend Discount Model (DDM) is appealing from a theoretical perspective since it values equity directly on the basis of cash flows flowing to the equity owners. It defines the value of equity (V_0^{Equity}) as the sum of all the future dividends (DIV_t), discounted at the cost of equity capital (r_E). It is expressed as below (Penman, 2013, p.112):

$$V_0^{Equity} = \sum_{t=1}^{\infty} \frac{(DIV_t)}{(1 + r_E)^t}$$

To account for dividend flows after the explicit forecast period, the constant growth model of Gordon (1962) can be used. Thereby a continuing value with constant perpetual growth (g_T) is derived at the end of the forecast horizon. The model is then expressed as follows (Penman, 2013, p.113):

$$V_0^{Equity} = \frac{DIV_1}{(1 + r_E)} + \frac{DIV_2}{(1 + r_E)^2} + \cdots + \frac{DIV_T}{(1 + r_E)^T} + \left[\frac{\frac{DIV_{T+1}}{(r_E - g_T)}}{(1 + r_E)^T} \right]$$

Despite being theoretically appealing, the DDM-model is difficult to apply in practice and isn't frequently used by analysts (Demirakos et al, 2004; Imam et al, 2008). This is due to

difficulties in determining a reasonable cost of equity capital and its reliance on company dividend policy (Imam et al, 2008). Many companies don't pay dividends while they are growing and for those that do, the size and growth rate of the dividends are difficult to project. The DDM-model is thereby more suitable for valuing mature companies, but even then, incorporating dividend policy to determine value is problematic since there is no direct linkage between the two (See Modigliani & Miller, 1961).

2.2.2.2 Discounted Cash Flow valuation

The most commonly used fundamental model by analysts is the DCF-model (Demirakos et al, 2004; Imam et al, 2008, Green et al, 2016, Markou & Taylor, 2014). This type of valuation is based on free cash flows (FCF_t), which flow to both equity owners and debt owners. The discount rate used in the DCF-model is thereby the Weighted Average Cost of Capital (r_{WACC}) of the firm's debt and equity (Koller et al, 2015, p.283). The WACC should reflect the riskiness of firms' free cash flows, meaning that it should be higher for firms involved in riskier businesses or on riskier markets. The DCF-model derives a value of the entire firm (generally referred to as Enterprise Value), from which the equity value is calculated by subtracting financial net debt (V_0^{ND}). This can be expressed as below (Penman, 2013, p.116):

$$V_0^{Equity} = \frac{FCF_1}{(1+r_{WACC})} + \frac{FCF_2}{(1+r_{WACC})^2} + \cdots + \frac{FCF_T}{(1+r_{WACC})^T} + \frac{\frac{FCF_{T+1}}{(r_{WACC}-g_T)}}{(1+r_{WACC})^T} - V_0^{ND}$$

Equity analysts perceive that the reliability of the DCF-model is reduced by a high degree of uncertainty in forecasts and technical complexity (Imam & Spence, 2016; Imam et al, 2008). Previous research indicates that analysts use an explicit forecast period for free cash flows of between 6-10 years before relying on a continuing value (Markou & Taylor, 2014; Green et al, 2016). The free cash flows are generally forecasted indirectly through the line items of the income statement and balance sheet, which implies making predictions on a wide range of factors that affect earnings growth, margins and asset turnover. Damodaran (2013) suggests that a way of reducing uncertainty is to limit the amount of input factors and, in line with this, Barker (1999) finds that many analysts prefer to apply valuation models using relatively few, but reliable input factors.

However, rather than the analyst's own conviction of the suitability of a valuation model, research has shown that its acceptability among clients is the most important factor for his/her decision to use it or not (Imam & Spence, 2016; Brown et al, 2015; Demirakos et al 2004). This is in line with research by Barker & Imam (2008) and Barker (2000), which shows that maintaining client relationships and generating commission income is one of the most central jobs of equity analysts.

2.2.3 Managing investment risk through triangulation and scenarios

Rather than using a single valuation model, analysts often rely on several models as a means of decreasing uncertainty and obtaining a more precise equity appraisal. A lot of research shows that simple and fundamental models are used in combination and as complements of each other (Green et al, 2016; Markou & Taylor, 2014; Imam et al, 2008; Barker, 1999, Liu et al, 2002). It has been found that analysts' target prices commonly are calculated as an average of the valuations or by simply assigning a value subjectively from the range. Analysts may also rely on a primary valuation tool and a secondary valuation tool, where the secondary tool is used as support and a way of checking the valuation of the primary tool. Imam et al (2008) and Green et al (2016) find that DCF-valuations are used as a way of supporting multiple-valuations in this way.

On the same topic, Imam et al (2008) discuss how the DCF-model largely is a vehicle for signaling trust to buy-side institutions and have less importance for the valuation process in itself. In addition, the uncertainty and complexity of the input factors cause analysts to rely on subjective judgment when estimating them. Similarly, Barker (1999) finds that analysts' application of the DCF-model is characterized primarily by approximation and subjective judgment rather than quantification. Imam et al (2008) reason that this is because the model is mainly used vis-a-vis buy-side clients as a way of solidifying valuations which are actually based in multiples. However, Imam & Spence (2016) find that buy-side institutions rather value the knowledge and expertise of sell-side analysts than the accuracy of their valuations. The researchers discuss the concept of analysts' social and technical capital, related to that they follow fewer companies than their buy-side clients. As previously mentioned, analysts' social capital refers to their connections and networks. The technical capital on the other hand is related to their analytical and calculative abilities. Imam & Spence (2016) find that analysts' technical capital is mainly analytical and related to their deeper knowledge of companies and industries as well as their accounting expertise and better access to

information sources. Thereby sell-side analysts' forecasts and valuations are less important than the arguments and assumptions that underlie them, expressed as *context* being more important than *precision*.

Due to the inherent difficulties in making precise valuations, some analysts have been found to rely on scenarios in their reports. Joos et al (2016) investigates how sell-side analysts use scenarios to assess the implications of certain risk factors on valuations. The analysts in the study relied on three different scenarios that captured the valuation-effects of uncertain outcomes related to factors such as new product launches, regulation and macroeconomic conditions. In relation to this, Damodaran (2013) discusses how certain types of risk factors are especially suitable for scenario-based analysis. He makes a separation between continuous and discrete risk, where continuous risk affects firms' fundamentals constantly and discrete risk shows up in the form of catastrophic events such as government regulations or failed research projects. Discrete risk is too complicated to account for in the discount rate, but since it can be categorized into clearly defined outcomes, it is a suitable target of scenario-analysis.

2.3 Estimating the cost of equity capital

As has been briefly deliberated on, the investment risk for equity owners can be quantified through the cost of equity capital. Discussed by Fama & French (1992) and Jagannathan & Wang (1996), the way that practitioners and academics think about the cost of equity capital and use it to price stocks is heavily influenced by research of Sharpe (1964) and Markowitz (1952, 1959). Markowitz (1952) laid forward the concept of mean-variance efficiency, which implies that investors maximize utility by maximizing the expected return of their portfolios while simultaneously minimizing the variance. Sharpe (1964) and Lintner (1965) used this concept to develop a framework for pricing securities, which is referred to as the Capital Asset Pricing Model (CAPM). Research on sell-side equity analysts by Markou & Taylor (2014), Brotherson et al (2013) and Pinto et al (2015) shows that using the model to determine the cost of equity capital has become the practical norm among analysts, even though there is skepticism among them towards its validity.

The CAPM has a portfolio perspective on investment risk and assumes that investors hold well-diversified portfolios, meaning that idiosyncratic risk is eliminated. Thereby investors can only receive compensation for taking on macro-risk (related to the overall market), known as systematic risk. A stock's exposure to systematic risk is captured by its beta. The total risk

premium of a stock (TRP) is a function of its beta multiplied with the risk premium for the entire market (MRP).

$$TRP = \beta * MRP$$

The cost of equity capital (r_E) is estimated simply as the total risk premium plus the risk-free rate (r_f).

$$r_E = r_f + TRP$$

The model thereby contains three input factors, the risk-free rate, the beta and the market risk premium, which are needed to estimate the cost of equity capital. Some of the underlying theory behind the input factors and how analysts estimate them in practice will now be discussed.

2.3.1 Determining the risk-free rate

A risk-free investment can neither have any default risk nor any reinvestment risk (Damodaran, 2008). Thereby, government bond-rates are a reasonable proxy since governments, unlike corporations, have the option of printing currency to honor their debt obligations. During times of deflation or very low inflation, Koller et al (2015, p.289) recommend adding a premium to the risk-free rate in anticipation of higher future interest rates. A capital markets study, *Riskpremiestudien* (PWC, 2017) found that some Swedish equity analysts made this adjustment, but that the majority relied on either 5-year or 10-year government bond-rates.

In a combined interview and content-analysis study, Green et al (2016) find a wide dispersion in the way that analysts determine the risk-free rate. Of the 120 analyst reports that they examined, 84% had a risk-free rate that was more than 0,3 percentage points (p.p.) dispersed from the 10-year US-treasury bond. The chosen treasury bonds varied between 5 and 30 years in time to maturity and the risk-free rate was estimated at anything between 0,2% and 5%. The dispersion in choice of risk-free rate was found to have a notable effect on the target prices that the equity analysts calculated. On average, the returns implied by the target prices changed with 14% due to this dispersion. Similarly, Markou & Taylor (2014) found a mean

dispersion of 0,75 p.p. and a maximum of 2,2 p.p. of analysts' estimates of the risk-free rate. They also found that disagreement persisted among analysts from the same brokerage institution.

2.3.2 Determining the beta

The CAPM-beta (β) is the regression coefficient of a security's return with the return of the market portfolio, or a measure of its systematic risk. It is defined as below:

$$\beta_i = \frac{Cov(r_i, r_M)}{Var(r_M)}$$

The market portfolio in the CAPM is value weighted and contains all assets in the economy (Damodaran, 2009). This has been criticized in academic research since it makes the model impossible to test empirically (Roll, 1977). In practice, the market portfolio is proxied using indexes (Damodaran, 2009). The index used should be value weighted and well diversified to match the investment opportunities available to the marginal investor. Commonly, equity indexes such as the S&P 500 are used since equity prices are reported more frequently than other asset classes (Damodaran, 2009). While the use of an equity index as a proxy is theoretically incorrect, Stambaugh (1982) finds that is does not affect the validity of the CAPM.

To determine the regression, historical observations of stock returns are used, but finding an appropriate time period involves a trade-off. While using longer time periods implies a greater number of observations, it also means that firm fundamentals may have changed (Damodaran, 2009), implying that using long time periods is more suitable for mature and stable companies. With regards to measurement intervals, Koller et al (2015) and Damodaran (2009) recommend using monthly returns. Using more frequent returns than that can result in errors due to the illiquidity of certain stocks.

Beta estimates among equity analysts vary significantly. Markou & Taylor (2014) find a mean dispersion of estimates of 0,26 among analysts covering the same company. The maximum observed dispersion was a striking 0,53, which clearly illustrates meaningful disagreements among analysts on how beta should be determined. However, the research by Markou &

Taylor (2014), does not investigate the underlying reasons for the large differences in estimates.

2.3.3 Determining the market risk premium

The market risk premium should reflect the risk of equity investments as well as the price that investors place on that risk, meaning that it reflects the collective risk aversion of all investors on the market (Damodaran, 2009). The most common approach to estimating the market risk premium is the historical approach, where stock returns over long time periods are compared with the, at the time, prevailing risk-free rates. Similarly to the beta estimation, this approach involves a trade-off in that using a long time period is essential for reducing noise, but it is also reasonable that investor risk aversion has changed over time.

Dimson et al (2011) perform what is likely the most extensive research on the global market risk premium. Using data from 19 countries, from 1900 and onwards, they find a risk premium of between 3% and 5% depending on some of the assumptions made. In practice, Green et al (2016) and Markou & Taylor (2014) observe a wide dispersion in the market risk premium used by equity analysts. For analysts covering the same company, Markou & Taylor (2014) observe an average risk premium of 5%, with a median dispersion of 1,3 p.p., while Green et al (2016) find that estimates range between 4% and 11%. Similar results were found in the previously referenced capital markets survey (PWC, 2017). The survey showed that Swedish equity analysts used a risk premium of anywhere between 3,3% and 9,3%, with a mean of 6,5%.

2.3.4 The Fama & French three-factor model

Empirical research, such as Reingaum (1981), Lakonishok & Shapiro (1986) and Fama & French (1992) have disputed the correlation between the CAPM-beta and excess returns. Fama & French (1992) propose adjusting the CAPM to improve its empirical validity. In their research, they found that a model that incorporates the extra risk associated with owning small stocks (in terms of market capitalization) and stocks with a high B/M-ratio, is significantly better at explaining excess returns. They thereby suggest adding these two additional factors to the CAPM.

While Fama & French (1992) could not explain the economic rationale behind their model, because of their strong empirical results it has had a meaningful impact in academia as well as

among practitioners. It is commonly referred to as the Fama & French three-factor model. As previously mentioned, the content-analysis studies by Lui et al (2007) and Joos et al (2016) show that equity analysts incorporate the B/M-ratio and market capitalization when determining risk ratings and the spread between valuation scenarios. Similarly, PWC (2017) showed that Swedish equity analysts tend to adjust the market risk premium for size. 84% of the respondents applied a size-adjustment to risk premium of between 0,6-3,8% depending on companies' market capitalization.

2.3.5 Fundamental-based estimation of the cost of equity capital

An early study by Beaver et al (1970) evoked discussions of accounting-based figures as predictors of stock return-volatility. In their research, the correlation of accounting-based risk measures (for example earnings volatility, dividend payout-ratio and financial leverage) with the conventional return-based measure of investment risk was studied. They argued that a risk measure that uses return-based data is incomplete as long as the underlying causes of stock price changes have not been investigated. In their study, Beaver et al (1970) find that accounting-based risk factors are impounded in stock price changes and therefore conclude that, in the same way as a return-based risk measurement, an accounting-based measurement can be used for predicting the riskiness of returns. In line with this finding, Penman (2010) discussed how the advantage with an accounting-based risk measurement is the underlying principles of accounting data. The accounting principles, as mentioned by standard-setters in the conceptual frameworks of IASB and FASB, should contribute to that accounting information can be used to forecast future levels of cash flows (i.e. to support both forecasting and assessing the expected riskiness of those forecasts).

A study by Nekrasov & Shroff (2009) proposed a methodology for calculating an explicit cost of equity capital with fundamental factors that are based on accounting information. Inspired by Fama & French (1992), this model is also a three-factor model. However, rather than relying on return-volatility, the factors in Nekrasov & Shroff (2009) are accounting-based. The first factor is an accounting beta, defined as the covariance of a firm's return on the book value of equity (ROE) with the market's ROE. The other two factors in the model are earnings size and the price-to-earnings ratio. The researchers find that the empirical validity of the model is strong since it gives significantly lower valuation errors than the CAPM and three-factor model of Fama & French (1992). Further, they discuss how accounting-based risk

measurements can allow the source of risk to be traced and analyzed, in a way that is not possible when looking at historical stock returns.

Similar inferences about the high value of accounting-based models for quantifying investment risk were made in a study by Lyle et al (2013). These researchers incorporated variables such as B/M and dividend yield into their model and similarly found that it gave smaller valuation errors than the CAPM and Fama & French (1992). Together these studies indicate that risk measurement can be improved by incorporating accounting figures when calculating an explicit cost of equity capital.

However, whether the findings in Beaver et al (1970), Nekrasov & Shroff (2009) and Lyle et al (2013) relate to that investors and analysts actually use accounting information as determinants for explicit risk measurements has not been covered. An alternative explanation is that the factors which investors consider correlate with accounting based risk-measures. As discussed by Penman (2016), fundamental-based risk measurement has been discussed in research, but the degree to which it is applied in practice remains uninvestigated.

2.4 Implications of previous research and discussion of the literature gap

Recent studies have highlighted that there is little research on how sell-side equity analysts assess and incorporate investment risk in their valuations and analyses (Peasnell et al, 2018; Joos et al, 2016; Lui et al 2012). While the research environment surrounding equity analysts' behavior is extensive, Schipper (1991) and Bradshaw (2011) have criticized it for being too narrow in scope and asked for additional research on how analysts' information processing and translation of earnings into valuations happen in practice. This critique has developed a new area within accounting research about the "black box" of equity analysts' behavior. The purpose of this thesis is to shed light on this black box from a new angle, by using primary sources to gain an understanding of how equity analysts think about investment risk and how it affects their valuations. While certain quantitative studies have researched the risk factors that analysts consider, their thought processes and underlying reasoning have not been thoroughly investigated. Our intent is to explore the more subtle thought processes under which sell-side equity analysts incorporate investment risk into valuations and analyses. Thereby, we investigate based on the following research question:

- How do sell-side equity analysts handle investment risk in their analysis and valuation of common stocks?

The research question is especially relevant given an increasing prevalence of the DCF-model for valuing equity among analysts, despite that criticism of using the CAPM to quantify investment risk remains (Fama & French, 1992; Jagannathan & Wang, 1996). Further, research by Beaver et al (1970), Nekrasov & Shroff (2009) and Lyle et al (2013) indicate that using accounting-based models to calculate the cost of equity capital leads to more accurate valuations than relying on the CAPM.

3 Methodology

The methodology section describes and analyzes the process under which the study has been conducted. This includes an outline of the research design (3.1), an explanation of the data collection (3.2), a description of how the data has been analyzed (3.3) and finally a discussion of research quality (3.4).

3.1 Research Design

3.1.1 Empirical Method

As discussed in the literature gap, the purpose of this thesis is to study the thought processes and underlying reasoning of sell-side equity analysts when dealing with investment risk. When deciding on the empirical method, we have considered the complexity of the phenomena that we are studying and how it is embedded in a wider context of equity analyst behavior. One part of contributing to a more in-depth understanding of analyst behavior is to understand why they act in a certain way. This implies that, as researchers, we have strived to see the world from the analysts' perspective and gather data that captures their thoughts and reasoning. For this purpose, a qualitative, rather than quantitative study is appropriate (Lundahl & Skärvad, 2016).

3.1.2 Research Approach

Of the two main types of research approaches, inductive and deductive, this thesis has an inductive approach. While deductive research relies on existing theory to derive a hypothesis that is then tested using the empirical data, inductive research rather uses the empirical data to create new theory (Bryman, 2011). Inductive research is thus not guided by previous research in the same way, instead the research question and the theoretical framework are shaped by the collected data, implying that the focus of the study can shift as it progresses. The approach is thereby open and explorative, and it is especially suitable when there is a lack of previous research (Eisenhardt, 1989).

The inductive approach has characterized the work with this thesis through the intertwinement of theory, data and analysis (Lundahl & Skärvad, 2016). The first step in writing the thesis was to put together an extensive and broad theoretical framework based on an initial research

question aimed at investigating how equity analysts determine the cost of equity capital. This theoretical framework laid the foundation to constructing an interview guide that was used for the first interviews. However, from these interviews it became evident that the study could be improved by also incorporating other tools and processes used by the analysts to handle investment risk. Thereby, the research question and the theoretical framework, as well as the interview guide, were revised to better match the collected empirics. As the study progressed, this iterative process continued. The theoretical framework was revised a final time after all the empirics had been collected, and the researchers had agreed on the most relevant and interesting themes on which to base the analysis.

3.2 Data collection

3.2.1 Type of data

Given the study's broad and open approach and the need for detailed and reflective answers, the empirics for this thesis have been gathered through the means of semi-structured interviews (Lundahl & Skärvad, 2016, p.132). Semi-structured interviews are a suitable tool for inductive research since the questions asked are mainly open-ended and allow the interviewees to speak freely, meaning that the empirics become less biased by the researchers' pre-existing beliefs (Bryman, 2011). The knowledge that is created stems from the researchers' interpretation of the interviewees' answers (Brinkmann & Kvale, 2014, p.72).

An alternative or complementary data collection method would have been to conduct a participant observation study (Bryman, 2011, p.262). This would have allowed us to study the analysts' behavior directly, rather than being dependent on their own depictions of it. However, conducting a study in this manner comes with practical challenges. Since we have strived to improve the study's analytical generalizability by collecting data from a multiple of institutions, gaining access and finding sufficient time would have been difficult. For these reasons, a participant observation study was not considered practically feasible.

3.2.2 Sample selection

Results from qualitative research are not statistically generalizable in the sense that inferences for entire populations can be made. However, qualitative studies can still be analytically generalizable in that they are transferable to a wider context and give rise to new perspectives and frameworks for analyzing empirical data (Lundahl & Skärvad, 2016, p.244). This means that study participants are chosen from purposive rather than random sampling (Bryman,

2011, p.350). Thereby the participants of this study have been contacted on the basis that they could be expected to generate relevant knowledge in relation to our research question, rather than being randomly selected. To make the findings applicable in a wider context and allow for interesting analysis, analysts from different institutions and with different sector focus have been interviewed.

Interviewees were either identified through the Investor Relations-function of the companies they follow, or they were referred to by previous interviewees and contacts of the researchers. They were first contacted by e-mail and in those cases where there was no response, a follow-up phone call was made. The e-mails specified the purpose of the thesis and the topics of investigation in broad terms since sharing such information makes interviewees more prone to participate. In a few cases, the interviewees asked for a summary of the questions beforehand, which they were then granted. However, the summary was limited in scope since we wanted spontaneous answers to questions more directly related to the research question.

3.2.3 Data description

The empirics of this thesis consist of 18 interviews with 20 sell-side equity analysts from 13 different institutions (see Table 1 on page 28). In addition, a brief interview has been conducted with a macro-strategist about how the risk-free rate and market risk premium are determined, since this decision is centralized at many companies. The interviewees follow companies from a wide range of industries and of varying size (from micro-cap to large-cap). All the analysts are based in Stockholm, Sweden and they mainly follow companies listed on Swedish stock exchanges, with OMX Stockholm being the most common. Three of the interviews were conducted over phone, two in cafés and the remaining thirteen at the interviewees' offices. During two of the interviews, two analysts participated rather than one. The downside to conducting interviews in this way is that an interviewee may adjust the answers based on the answers of the other interviewee (Lundahl & Skärvad, 2016 p.141), which is something that we have had in mind when analyzing the data. The upside on the other hand is that it allows for more data to be collected.

When deciding on the number of interviewees and institutions there was a practical concern in that gaining access is inherently difficult since equity analysts tend to be very busy. Further, qualitative data collection always involves a trade-off in that more data improves analytical generalizability but also makes in-depth interpretations of each interview more complicated

(Brinkmann & Kvale, 2014). The number of interviews was considered sufficient to reach a level of saturation (Brinkmann & Kvale, 2014, p.156) since the last interviews contained significant amounts of confirmation and repetition of the findings from previous interviews.

The interviews were conducted between February 23, 2018 and April 12, 2018, and they lasted between 35-60 minutes, with an average of 45 minutes. All interviews were recorded and later transcribed, and in addition notes were taken during the interviews. The length of the interviews depended mostly on the amount of detail in the analysts' answers and we always had enough time to get sufficiently extensive answers to the questions that we posed.

3.2.4 Interview technique

As previously mentioned, semi-structured interviews were used to gather the empirics. While semi-structured interviews require an interview guide, it is not rigorously followed and follow-up questions can be asked when deemed relevant (Lundahl & Skärvad, 2016). The interview questions are open-ended to let the interviewees speak freely and avoid leading them to the answers. Open-ended questions have been found to give more extensive and thoughtful answers (Brinkmann & Kvale, 2014, p.176). In general, we have tried not to interrupt the interviewees, but sometimes it has been necessary when they have gone off topic.

The interviews started with a few simple background questions such as: *What industries do you cover? How long have you worked as an equity analyst?* Background questions are important for the analysis and asking these simple questions in the beginning of the interview has the additional benefit of making the interviewees comfortable and thereby encouraging them to speak more openly for the remainder of the interview (Lundahl & Skärvad, 2016, p.137). The background questions were followed by more general questions on valuation techniques and information sources. The last part of the interview specifically covered risk, risk factors and how they enter into valuations and analysis. At this point in the interviews, the interviewees had often already touched on the topic in their previous answers, implying a smooth transition. In several interviews, the interview guide was merely used as a checklist to make sure that all relevant areas had been covered, since allowing the interviewees to speak freely also implies that they have a certain influence over the direction of the interview. In line with the inductive research design, the interview guide was adjusted during the course of

the study as new data was collected. Please see appendix 1 for a review of the final interview guide.

Both researchers participated during 18 of the 19 interviews, with one researcher leading the interview and the other taking notes and asking follow-up questions. This meant that one researcher had a more passive role, which allowed him to identify interesting themes that the interviewees could be asked to elaborate on. For qualified interviews, where the interviewees are very knowledgeable in their field (sometimes referred to as "experts"), as they were in this study, using two interviewers is valuable since having clearly defined roles facilitates more thorough data collection (Lundahl & Skärvad, 2016, p.139). Further, for these types of interviews it is especially important that the interviewers are well prepared and can master the technical language of the expert (Brinkmann & Kvale, 2014, p.187). We prepared for the interviews by studying and discussing the sector and the companies that each analyst covered and the risk factors that could be especially relevant.

3.3 Data analysis

Immediately following each interview, we discussed the main impressions and takeaways in an informal way. Following this, the interviews were transcribed by us as researchers and the transcripts were used for a more thorough analysis. While transcribing interviews is time consuming, it has the benefit of allowing the analytical process to start already when the data is being collected, since the transcriber is required to listen to the interviews very thoroughly. Further, transcribing the interviews allowed us to continuously make adjustments to the interview guide and also to evaluate the interview technique (see Brinkmann & Kvale, 2014, p.221).

The transcripts were printed and studied by both researchers individually. Each researcher read the transcripts, took notes and color-coded them according to themes that were deemed especially interesting. This is a form of data-coding which is suitable for a thematic analysis (Bryman, 2011, p.528). When identifying interesting themes, we in particular looked for repetitions between interviews and for similarities and differences in the interviewees' responses. Analyzing the empirics individually in this manner allowed each researcher to form his own view independently of the other researcher, decreasing the risk of group-think and subjectivity. The interpretations of the transcripts were then discussed and we agreed on the most important themes, which laid the foundation for the empirical analysis. These themes

were used to categorize the data in Excel, implying that relevant excerpts of the transcripts were related to each theme. It´s important to point out that the quotes that are stated in the empirical findings have been translated from Swedish to English, but have been thoroughly assessed to ensure accuracy.

3.4 Research quality

Quantitative research is often evaluated based on its validity, reliability and generalizability (Bryman, 2011 p.351). Since qualitative research doesn't include measurements and is not statistically generalizable, alternative approaches to evaluating studies have been suggested. Yin (2014) suggests evaluating exploratory case study research based on construct validity, external validity and reliability.

Construct validity refers to how well the outcome of the study reflects what has actually been studied. A problem with case study research is that the researchers' subjective judgment can make the data collection biased (Yin, 2014, p.46). The construct validity of this study has been improved by using semi-structured interviews for data collection, implying open-ended interview questions with room for reflection from the interviewees. Further, we have tried to avoid leading the interviewees and have only interrupted them when they have talked about topics that were irrelevant for the study. However, the construct validity of interview studies can also be adversely affected by the reliance on interviewees' own depictions of their behavior and we cannot exclude that the analysts' actual behavior differs from the way that they have portrayed it in the interviews. This is however not something that we have noticed, rather we perceive that the analysts have been honest with us.

External validity deals with the analytical generalizability of the study, i.e. the degree to which the findings are applicable in a more general context. The analytical generalizability of this study is enhanced by the exploratory research question, which facilitates a more reflective analysis that can be relevant in a wider setting (Yin, 2014, p.48). Further, the fact that we have interviewed analysts from 13 different institutions that follow a wide range of companies gives us a more extensive perspective.

Reliability relates to the degree to which a later researcher could use the same procedures to conduct the same study and arrive at the same findings and conclusions (Yin, 2014, p.48). Qualitative research has an inherent degree of subjectivity, which means that it is not

replicable in the same way as quantitative research (Bryman, 2011). However, certain steps can still be taken to make qualitative studies more reliable. The key to ensuring reliability is documentation. The process of how this study has been conducted has been outlined above. Furthermore, all interviews have been recorded and transcribed and the data has been examined and analyzed in a structured way. Reliability also refers to how well the researchers agree on how to interpret their findings (Bryman, 2011, p.352). As outlined above, both researchers have participated in the data collection, coding and analysis for this thesis. The data was studied by each researcher individually before being discussed together. Analyzing the data individually means that the researchers are less likely to be affected by each other's opinions. However discussing the findings and interpretations together ensures that a broad perspective and a confidence in the interpretation of the data can be gained.

4 Empirical Findings

Section 4 presents our empirical findings. It includes a description of the sample of analysts (4.1), the valuation models they use (4.2), the risk factors which the analysts consider (4.3), how risk is incorporated into valuations (4.4) and the way scenarios are used for conveying risk information (4.5).

4.1 Description of analyst sample

The sample in this study consists of 20 sell-side equity analysts from 13 different institutions in Stockholm, Sweden. Additionally, one macro-strategist, who is responsible for making central estimates of the risk-free rate and market risk premium at Company L, has been interviewed as a complement. The analysts have on average 5 years experience within sell-side equity research, ranging between 1 and 15 years. Furthermore, 18 of the 20 analysts are specialized in one or two sectors, while the remaining two are generalists that instead focus on small- and micro-cap companies. The analysts follow between 3 and 23 stocks, with an average of 11 stocks. In accordance with the ICB[2] industry classification, the industries that the analysts cover include: Health care, Financials, Consumer services, Technology, Consumer goods, Telecommunications, Basic materials and Industrials. For a more detailed description of each analyst, please see table 1 on the next page.

Regarding the institutions in the sample, most of them (9/13) mainly produce independent research that is sold to institutional investors, such as mutual funds, pension funds and hedge funds. However, we have also included some institutions (4/13) that produce independent research as well as commission-based research, which is paid for by the company subject to the analysis. The latter approach primarily targets micro- and small-cap companies.

[2] The Industry Classification Benchmark (ICB) that is used by Nasdaq.

Table 1.
Description of sample: Industry coverage, Experience, Market size and number of stocks covered.

Company	Analyst	Industries covered**	Experience	Market size	Stocks covered (#)
Company A	Alpha	Generalist	3-5 years	Small-cap	20
Company B	Bravo	Health care	10-15 years	Small, Mid & Large-cap	8
	Charlie*	Financials	10-15 years	Small, Mid & Large-cap	23
	Delta*	Financials	1-2 years	Small, Mid & Large-cap	23
Company C	Echo	Generalist	3-5 years	Micro & Small-cap	12
Company D	Foxtrot	Consumer services, Technology	6-9 years	Micro, Small & Mid-cap	8
	Golf	Health care	1-2 years	Micro, Small & Mid-cap	6
Company E	Hotel	Consumer goods, Industrials	1-2 years	Small & Mid-cap	15
	India	Consumer goods, Financials	3-5 years	Small & Mid-cap	16
Company F	Juliett	Health care	1-2 years	Small & Mid-cap	3
Company G	Kilo	Technology, Financials	3-5 years	Small, Mid & Large-cap	10
Company H	Lima	Telecommunications	6-9 years	Mid & Large-cap	18
Company I	Mike	Industrials, Financials	10-15 years	Mid & Large-cap	15-20
Company J	November*	Basic materials, Industrials	3-5 years	Small & Mid-cap	11
	Oscar*	Financials	1-2 years	Mid & Large-cap	7
Company K	Papa	Industrials	10-15 years	Large-cap	5
Company L	Quebec	Industrials	1-2 years	Mid & Large-cap	7
	Romeo	Health care, Technology	3-5 years	Small, Mid & Large-cap	12
	Sierra	Consumer services, Technology	1-2 years	Small, Mid & Large-cap	7
Company M	Tango	Industrials	6-9 years	Mid-cap	6

* These interviews were conducted with two analysts simultaneously.
** Industry has been classified according to Industry Classification Benchmark (ICB), except for two analysts who said they were generalists.

4.2 Analysts' usage of valuation models

4.2.1 Most analysts prefer simple valuation models

The analysts show a strong tendency to rely on simple valuation techniques rather than fundamental models when valuing equity. Of the twenty analysts, only three relied primarily on the DCF-model. These interviewees differed in how they incorporated risk into valuations, and quantified risk factors more extensively than the rest of the sample (see section 4.4.3). The remaining analysts preferred multiple-valuations and those following real estate companies also anchored their valuations on net asset value, derived from the companies' balance sheets.

Many interviewees were skeptical to how sensitive the DCF-model is to its input factors, making it easy to manipulate. Several of them mentioned that their clients had similar opinions and were not interested in discussing DCF-valuations, which were rather seen as something that should be included in a report but was not given much attention. The interviewees worried about how small changes in assumptions on the long-term growth rate and the cost of capital had huge impacts on the valuation. They were also skeptical to the inherent long-term perspective of the DCF-model, considering that the stock market is cyclical and primarily short-term factors are reflected in prices.

> "*You can tweak a DCF however you want, and you can make it show exactly what you want, it is a very non-transparent model*." (Analyst Echo)

> "*It is important to be aware of that the DCF-value and the value of a stock shouldn't be the same thing, because a DCF is across-the-cycle to begin with, meaning that it accounts for so many years in the future."* (Analyst Mike)

The foremost reason for the interviewees' skepticism to the DCF-model is that they see their job as picking stocks that will outperform the market or their sector rather than those that are fundamentally undervalued. The interviewees emphasize that they can contribute with knowledge and recommendations about the stocks that they follow but they cannot make predictions about the direction of the overall market. Thereby, they perceive that they add value by evaluating companies relative to each other rather than in absolute terms, and therefore many analysts preferred to anchor the valuation on peer-multiples.

"*It's very much this kind of relative-game… this company has a lower multiple, but it should actually be valued in line with that company or higher… and accordingly I assign a value. I rather use that kind of argumentation… instead of explicitly asking what required return one is using, it was a long time ago someone asked about that*." (Analyst Bravo)

"*If the value of the sector drops, the relative outperformance within the sector is still there […] you make top picks within your sector*." (Analyst Kilo)

Some analysts also rely on historical multiples when valuing stocks. Historical multiples are used by these analysts to examine how the market has priced a stock historically, which can be relevant for challenging the current valuation. However, the analysts in our sample do not perceive that they can extract valuable information from index multiples of the entire stock market. The companies that make up the index have different fundamental characteristics, making comparisons less informative, and, as mentioned above, the analysts prefer not to speculate in the pricing of the entire stock market.

"*I am an equity analyst and not a market analyst. I don't care if the stock market goes up or down 20%, I try to find the stock that beats the market."* (Analyst Romeo)

Several analysts also perceived a value in breaking down companies into different sub-divisions and using sum-of-the-parts valuation, making it possible to find peers with different characteristics depending on the business segment. In particular, these procedures are used to a higher extent when there is no or only a few appropriate peer-groups for the company as a whole.

4.2.2 The DCF-model is primarily used as a complement

Despite being skeptical to the DCF-model as a primary valuation tool, several of the interviewees viewed it as a meaningful complement to multiple-valuations. The interviewees emphasize that their work is heavily based in assumptions and that valuations are inherently uncertain. Therefore several interviewees use triangulation of valuation models specifically to narrow down a range of possible values and get a more robust valuation.

"*The only thing you know is that you are going to be wrong and then you simply have to work with many different models which can give you a little bit of extra information which means that you can reduce the error which you will get in the end*." (Analyst Tango)

Nine of the interviewees saw the DCF-model primarily as a useful complement, which can be used to verify a valuation. By entering their assumptions on factors such as growth and margins into a DCF-model, the interviewees perceived that they could check that their target price was reasonably in line with the fundamental value. Further, several interviewees considered that the DCF-model was useful to give an indication of the potential long-term value of a company, albeit under uncertain assumptions.

"*In most of my models I have some sort of support DCF just to sanity check myself a little. If I make reasonable assumptions on the discount rate etc., then I end up here. And my target price might be a little bit higher or lower. How am I thinking differently then?*" (Analyst India)

4.2.3 Qualitative discussions with clients rather than target prices

A majority of the interviewees had institutions as their main clients and in addition to writing a report, they also spent a lot of time discussing cases with the clients. The interviewees felt that the clients valued the discussions and the arguments laid forward in the reports significantly more than the target prices. Several interviewees even expressed that while recommendations were still important, their clients did not care at all about target prices. The interviewees thereby saw their role as being more about providing information that the clients could use to form their own opinions. Due to the inherent difficulties in differentiating themselves from other analysts and having well-informed opinions on factors that are more related to the long term, several analysts in our sample focused primarily on short-term factors in these discussions.

"*Target prices for example are not that interesting for them because they have their own opinion, they want to look at it themselves as well. Then the argumentation as to why the company is worth buying is more interesting for them."* (Analyst Hotel)

> "*So you might model specifically what you believe on a 1-year time horizon, and then you might have a relatively differentiated opinion compared to the consensus or compared to your competitors. So that is basically where my value is, because when 2-3 years or more passes, everyone just tends to assume mean-reversion. [...] So most of the time everyone has similar positions on the long term but differentiate on the short term.* (Analyst Tango)

Many analysts emphasized that buy-side clients often had their own models and did their own valuations, and that sell-side analysts were rather a source of information and a discussion partner. Some interviewees mentioned that sell-side analysts had the benefit of following a much more concentrated portfolio than the buy-side investors, meaning that they had a deeper knowledge of each company.

> "*They have models for everything themselves, but they don't have that much detail. We have a much more condensed portfolio which we follow and should be aware of every piece of gossip there is on a company basically.*" (Analyst November)

4.3 Risk factors and sources of information

Most analysts in our sample view risk as an embedded part of the valuation rather than something to be assessed independently. This means that rather than using quantitative metrics, risk has to be evaluated from a holistic perspective since it is intertwined with companies' operations and fundamental characteristics. Thereby, in order to assess investment risk, the analysts saw it as vital to have a rigorous understanding of a company and its business model. They reduced uncertainty in valuations by staying well-informed and gathering information from a wide array of sources including company management, financial reports and industry reports as well as suppliers, customers and product experts. Significantly, for analysts who followed smaller companies, contact with company management was often the most important source of information. These analysts emphasized the importance of having a trusting relationship and honest communication with management to reduce uncertainty about future performance. For them, a loss of confidence in management had a significant negative impact on their holistic view of a company.

"*Risk and the risk definition, to us it is very challenging to define and quantify. It's rather something one has to take into account in every step of the analysis… based on company risks, market risks, financial risks, and management. It's extremely difficult to tell what is right or wrong and how you should be approaching it*." (Analyst Charlie)

4.3.1 Deriving risk information from the financial statements

The analysts view the financial statements as significantly informative on investment risk. This is in particular true for the income statement, where the volatility and level of earnings and earnings-margins were seen as important risk indicators. High earnings and high earnings-margins were deemed to provide a safety margin, which for example makes the company less sensitive to an economic downturn or recession. Further, earnings as well as profitability were used to evaluate companies on a holistic basis, where companies with strong financial performance are seen as less risky. Additionally, some analysts saw the payout-ratio as informative on investment risk since companies with high payout-ratios may not be as dependent on uncertain reinvestments.

"*The comparable company has had a much more stable increase in sales and more stable margins. While for this other company, the margins have gone up and down, there is no red thread. In such a company, the risk is of course a lot higher than for companies that have shown stable margins over a long period of time*." (Analyst Bravo)

The cash flow statement was informative to many analysts, but primarily when used in conjunction with the income statement. It provided information on earnings quality and many analysts attested its significance for verifying reported earnings and understanding the cash generating power. Further, several analysts considered companies with high capital expenditures relative to sales as riskier, in line with the inherent riskiness of reinvestments discussed above. Higher cash flows thereby typically yielded a lower investment risk.

"*It's simply good to see that money is generated and if it isn't, it's a warning sign that something may be up with their numbers, because in the end it has to be converted to cash for the investors to get anything back.*" (Analyst Sierra)

With regards to the balance sheet, most analysts in our sample rely on it for evaluating companies' capital structure. They examine financial leverage in light of the underlying business, implying that it is incorporated into their holistic view of a company. High financial leverage in combination with high risk in business operations was seen as a substantial concern.

> "*We incorporate the leverage ratio in the full picture and it becomes more an aggregated view on leverage, interest rates lock-ins, the maturity. But I can't say we are modeling it in any way. It's rather included in our view of the company... do we think it's reasonable to pay a premium for a company that is highly leveraged? Probably not…*" (Analyst Charlie)

While most analysts were skeptical to the informativeness of the book value of assets, those following real estate companies find the B/M-ratio to be relevant for evaluating investment risk. This is because real estate assets are appraised at market value by external parties, implying that they are perceived to give a reasonable estimate of long-term value.

4.3.2 Deeper knowledge of companies' fundamental characteristics is important

When asking analysts what they base their risk adjustments on, most referred to a deeper knowledge about the company and industry. As has been discussed, the analysts improve visibility of future performance by having a rigorous understanding of companies' business models. Overall, companies with high visibility and recurring earnings, as well as fewer disruptive uncertainties were awarded higher valuations by the analysts. Thereby elements such as company management, competitors, competitive advantage, entry barriers, scalability and customer base are all important risk factors.

> "[…] *It's all the factors that you look at when you make forecasts: barriers to entry, management incentives, if management are shareholders themselves, is the underlying market strong? Do they have a niche where they can grow? I mean it's all the factors that you look at when evaluating an investment opportunity.*" (Analyst Foxtrot)

"*Everything that is recurring in some way… lower risk is better visibility and one should be willing to pay a higher multiple for that.*" (Analyst Charlie)

In addition, nearly all analysts mentioned that company size is informative on investment risk. Smaller companies are considered to be riskier than larger ones in part due to higher fundamental risks, such as a dependence on few products or vulnerability to competitor attacks. In addition they are seen as less liquid, implying a risk for institutional clients that are forced to sell stocks based on cash outflows from their funds. Some analysts also apply size adjustments as part of a standardized approach without deeper reflection.

"*For smaller companies one adds an additional risk premium to reflect an illiquid stock. That is discussable… theoretically it is debatable if it should matter or not if its a large or small company. But in practice, when we meet with funds and fund managers, given what happened in 2007, 2008, they are not allowed to own illiquid companies*." (Analyst Mike)

4.3.3 Short term market sentiments affect risk evaluations

Of the 20 interviewees, 18 make recommendations with a time horizon of 6 to 12 months. The analysts generally defined themselves as stock analysts rather than company analysts, implying that their main concern was the price development of the stock during that time period. While, as discussed above, the analysts' risk assessments are based on information on fundamental factors, they also have to consider how the stock market interprets that information. One of the implications of this is that the analysts evaluate fundamental risks from a short time-perspective since they perceive the stock market to be oriented towards the short term. Thereby risks that may materialize in the distant future, such as certain political risks, structural changes to entire industries and uncertain asset values in the balance sheet are of lesser importance.

"[…] *Well then the other market participants will view it as much better and then you should own the stock. The DCF-value might be half, but then I should still have a buy-recommendation. It's all about what I think that others will think that it is worth in a year*" (Analyst Romeo)

"*I would say it's rather difficult actually* [to incorporate long-term structural changes]*... yeah, no I don't know how you should include it in an appropriate manner. Because we, as I previously mentioned, have a 6-month target price so one typically… maximum a few years forward. So it becomes more a discussion rather.*" (Analyst Quebec)

4.4 Incorporating risk into valuations

4.4.1 Adjusting for investment risk in the valuation multiple

As mentioned above, most analysts in our sample primarily rely on multiples for valuing equity. In doing so, they tend to assess and evaluate investment risk in a qualitative and subjective way rather than quantifying risk factors. Several analysts highlighted the importance of "gut-feeling", personal judgment and their experience of the stock market. They felt that many risk factors were not quantifiable and rather part of the holistic view of a company, meaning that subjective judgment is necessary to determine a premium or discount on the multiple.

"*You can be calculating to some extent, but rather it can be included in the recommendation in some way. You will demand a lower valuation… or you will not accept a higher valuation if you believe there is a risk that may not be quantifiable, but still somehow perceived as a risk.*" (Analyst Charlie)

"*It has been a 30 % discount over time* [in comparison to a peer]*, the company has improved somewhat but maybe not all the way… since they have improved, the discount should maybe be 20 %, then you assess a 10 % premium because of the EBIT-margin improvement.*" (Analyst Papa)

4.4.2 Using the CAPM to incorporate investment risk in the DCF-model

As mentioned above, most analysts who used the DCF-model regard it as a complement to multiple-valuations. These analysts often stated that estimating the cost of capital was of low importance to them and they relied on a standardized and somewhat arbitrary approach. All of them used the CAPM to some extent, but applied it without much thought or reflection, instead prioritizing issues that were deemed as more important, such as making accurate forecasts. Many analysts in our sample thought that the model was abstract in the sense that the underlying causes for volatility in historical returns are hard to interpret. Further, some

analysts mentioned that the CAPM is opaque and sensitive to the input factors meaning that it can easily be used to manipulate valuations.

> "[…] *Depending on the variables that you put in with the risk-free rate, the risk premium, you can get* [the DCF] *to say pretty much what you want."* (Analyst Papa)

Some of the sector-specific analysts said that they used the same or a very similar cost of equity for all the companies that they follow, and in certain cases even the same WACC. The analysts based this on that the companies had similar fundamental characteristics and that they were interested in the companies' value relative to each other. However, several analysts mentioned that they, depending on company-specific risk factors, make smaller adjustments based on what appears to be reasonable in each case.

> "*I try to be as consistent as possible with the companies I cover, so the differences don't get too large. Comparable companies should have similar risk premiums so it doesn't get too subjective. The subjective part rather…. I rather spend my time doing decent estimates that I believe in and then use a relatively fixed WACC or discount factor among the companies*." (Analyst Bravo)

4.4.2.1 Determining the risk-free rate

The estimate of the risk-free rate was centralized at several companies, meaning that all analysts were expected to use the same rate. Some of the analysts were aware of how the risk-free rate was determined while others were more uncertain. The macro-strategist said that at his company, he determined the risk-free rate based on his view of long-term inflation and that it was adjusted every 2-3 years. Similarly, several analysts stated that they thought it was important that the risk-free rate was not changed too often since it shouldn't be a driver of valuations. Most of the analysts stated that the risk-free rate at their companies was set to reflect the long-term interest rate on Swedish government bonds. While some analysts simply used the return on 10- or 5-year Swedish government bonds, most relied on a higher, normalized rate because of the extraordinarity of the current interest markets.

> "*We have generally calculated with a normalized 10-year rate of 2%. That's kind of where the problem is, in the current interest rate environment. Because I*

think that no one dares to fully discount the low interest rate because they don't think that it is durable." (Analyst Delta)

4.4.2.2 Determining the market risk premium

Similarly as for the risk-free rate, the estimation of the market risk premium was centralized at several institutions. Despite this, some analysts stated that they deviate from the central estimates based on their own judgments of current market sentiments. Most analysts, as well as the macro-strategist, relied on capital market surveys and some also referred to papers by Damodaran as an input source. Further, several analysts referred to historical implied market risk premiums as basis for their estimates. In general, the analysts had an arbitrary approach to the market risk premium and it was through this factor that most analysts adjusted the cost of equity capital to better match their holistic view of companies' risk profiles. The estimates of the market risk premium ranged between 4-6 percent.

"*To be entirely crass, we have not put in that much work. We have looked at what the history books have indicated and also somewhat on some surveys from EY or KPMG… what the return requirement is and then you end up somewhere around those levels*." (Macro strategist, Company L)

4.4.2.3 Determining the beta

Most of the analysts used backward-looking betas from external sources such as Bloomberg when applying the CAPM. They frequently found industry-betas more reliable than company-specific betas, which were perceived to be affected by irrelevant noise on the stock market and volatility that the analysts were not in a position to comprehend or evaluate. The historical time period behind the betas varied between 2 and 10 years depending on the external source. Similarly to how they estimated the market risk premium, some analysts made subjective adjustments when using industry-betas, depending on if they considered the specific stock to be riskier or less risky than the industry overall.

"*Let's say that if you have 20 companies, you may go through these parameters, such as ROCE, growth potential in the near future, if they've had a'lot of one-off costs for failed projects etcetera. You just rank these companies qualitatively depending on the different dimensions*." (Analyst Tango)

4.4.3 Estimating the cost of equity capital with fundamental-based models

Three analysts in our sample relied on the DCF-model as their primary valuation tool. While these analysts evaluated the same fundamental risk factors as the rest of the sample, they perceived that, rather than relying on subjective judgment, these factors could be quantified into an explicit risk measurement. The institutions that they work for (Company D and J) have developed proprietary models, where a wide range of risk factors is used to calculate an explicit cost of equity capital. The financial statements provided valuable input information, where in particular historical earnings stability and profitability (ROCE) were key components. In addition, the models relied on other accounting information such as stability in sales, earnings-margins, capital structure and capital expenditures. However, the models could also quantify other types of more qualitative fundamental risk factors, such as geographical presence and quality of management, as well as market risk in the form of stock liquidity.

The analysts who used these models estimated the risk-free rate and the market risk premium in similar ways as the analysts who applied the CAPM. However, the company-specific risk exposure was determined in a significantly different way. Company J relied on a beta that was based on fundamental risk factors (rather than on historical return volatility), while Company D added the company-specific risk premium on top of the market risk premium and the risk-free rate.

> "*The suggested beta is dependent on stability in sales, EBIT-margins, ROCE, CAPEX/SALES, liquidity in the stock, which markets the company is present in. […] And then dependent on that, you get a beta. […] We take into account around 20 different parameters, but in particular we regard earnings stability and ROCE*." (Analyst November)

The two institutions differed in the sense that Company D, which primarily covered small companies, accounted for a wider and more extensive set of qualitative factors when estimating the company-specific risk exposure. The analysts at Company D perceived that for smaller companies, historical financial performance on a stand-alone basis is a less reliable indicator of future performance. Their proprietary model especially emphasized management

quality, but also incorporated factors such as competitors, competitive advantage, board ownership and management ownership.

> "*We look at different factors, management, profitability, we look at growth, financial strength… it's a range of different factors. We have a solid checklist of about 30 questions on each area. That's an analysis on its own […] The model is appropriate for entrepreneurial and smaller companies, but when one takes large-cap companies it's not as applicable. [...] So it's adapted to smaller growth companies primarily*" (Analyst Foxtrot)

4.5 Using scenarios to capture uncertainty in valuations

Regarding the use of scenarios in reports, there was a clear difference in opinion among the interviewees. Many of them thought that it was important to have a clear opinion about a stock, rather than hiding behind a range of possible values. They expressed that their clients expected them to take a stance and that there was little reason to base valuations in outcomes not projected to occur. However, seven of the interviewees always included three different scenarios in their reports, a positive bull case, a negative bear case and an expected base case. These interviewees saw it as important to illustrate how the value of a stock could vary with the assumptions made considering how uncertain these often were.

> "*I mean you can't just protect your back by saying that in this scenario this will happen and so on, they want an opinion of what you think is going to happen.*" (Analyst Lima)

> "*Scenarios are what is important, we think it is rather stupid to do a single scenario and say that that's it, when, in actuality, things can turn out both better and worse than expected, so we work with three scenarios to capture the sensitivity of the assumptions*." (Analyst Echo)

Most noteworthy, scenarios were used by the analysts who follow small-cap companies and companies within the pharmaceutical sector. The value of these companies is often heavily dependent on few projects and outcomes of uncertain clinical tests, implying that more bold assumptions have to be made. Most of the analysts who followed this type of research-based companies relied on probabilities for passing each stage in the clinical tests when making

earnings estimates. Since the earnings estimates can differ significantly between worst- and best-case scenarios, explicitly stating how they affect the valuation was perceived as helpful for conveying the risk-return tradeoffs. Further, a larger spread between the scenarios was perceived by these analysts as an indicator of higher investment risk.

> "*If you looked at these early companies, you would see that the spreads* [between scenarios] *are fairly large because of the uncertainty, but the closer you get to the market, the more these spreads tighten up*." (Analyst Golf)

4.5.1 Relying on discussions to convey risk information

The analysts who did not include explicit scenarios in their reports were still likely to rely on scenarios in a more informal way. Rather than calculating explicit values for several scenarios, they discussed with clients how potential outcomes and making different assumptions would affect the valuation. Several analysts mentioned that they thought it was important to state the assumptions underlying the valuation in their reports and comment on events that could affect the value. This meant that if the client questioned some of the assumptions made, the impact on the valuation of changing them had to be considered.

> "*Then the first question is always, what is the biggest risk that you see with this? So, often when you have a case people want to know what the biggest risk is… that it will not play out. So I spend quite a lot of energy on that, and then its very different from case to case what the biggest risks are*." (Analyst Oscar)

> "*Often you get a question like: what happens if construction output drops 60%, how will that affect the numbers, how will it affect the valuation […], then we calculate that*." (Analyst November)

5 Analysis

This section is devoted to analyzing our empirical findings in the light of previous research. In includes a discussion of the valuation models used (5.1), the most prominent information sources on risk (5.2), the analysts' holistic perspective on investment risk (5.3), how risk is incorporated into valuation models (5.4) and the usage of scenarios (5.5).

5.1 Simple valuation models are perceived as more reliable

In line with previous research (Brown et al, 2015; Demirakos et al, 2004; Hellman, 2000; Barker, 1999; Arnold & Moizer, 1984), our findings indicate that sell-side equity analysts primarily rely on simple, rather than fundamental, models when valuing equity. The analysts use multiple-valuations in part because these require fewer input factors and don't necessitate explicit multi-year forecasts. This implies that they rather employ valuation models that depend on data that is limited but perceived to be reliable, in line with Barker (1999). While most of the analysts in our sample also use the DCF-model, it is generally used as a complement to multiple-valuations rather than as the primary valuation tool. Several analysts perceive that a DCF-valuation can be informative on the long-term value of stocks, despite the model's high sensitivity to its input factors and particularly the cost of capital. Therefore the DCF-model is used more as a way of verifying multiple-valuations in an attempt to reduce uncertainty through triangulation, similarly to what was found in Green et al (2016) and Markou & Taylor (2014). However, we have also found that a few analysts use the DCF-model as the primary valuation tool. Their perspective on investment risk differs from the other analysts, which will be further discussed in section 5.4.3.

Imam et al (2008) drew the conclusion that sell-side equity analysts primarily use the DCF-model to signal trust to buy-side institutions, making it a part of their technical capital. We rather find that analysts who use the DCF-model do so for their own purposes, primarily as a way of checking multiple-valuations as discussed above. The analysts in our sample emphasize that their clients are not interested in discussing DCF-valuations and view the model as opaque and highly sensitive to uncertain input-factors. Further, most analysts in our sample find that their clients rarely express interest in target prices, but rather the assumptions and arguments underlying them. They thereby prefer to discuss risk factors and their potential

impact on company-value in a qualitative way with their clients instead of translating them into precise target prices. Thereby, drawing on the findings in Imam & Spence (2016), we find that, in the context of investment risk, analysts' technical capital primarily is *analytical* instead of *calculative* and relates to their in-depth knowledge of companies and industries rather than the accuracy of their valuations.

5.2 Analysts reduce uncertainty by staying well-informed

Our empirical data shows that staying well-informed and examining issues from a multitude of perspectives is important to analysts. The analysts in our sample reduce uncertainty in valuations by relying on a wide range of information sources. Our findings are in line with those of Barker (1998), Barker (1999), Graham et al (2002) and Brown et al (2015) in that contact with management, financial reports and industry reports were key information sources for the analysts in our sample. However, we also found that analysts gather information from key industry-players such as suppliers, customers and product experts. Since sell-side analysts follow fewer companies than their clients, they are expected to have a deeper knowledge and understanding of each one.

Imam & Spence (2016) define analysts' social capital as their connections and networks, highlighting how buy-side clients value their proximity to company management. We find that developing a close relationship with management is especially important when evaluating investment risk in small companies. In this context, historical financial performance is perceived to be a weak indicator of future performance and analysts thereby rely to a higher extent on information from company management, making a trusting relationship imperative. Thereby our study indicates that analysts' social capital gains in importance when uncertainty is high and there are fewer reliable information sources.

In particular for analysts who follow larger companies, accounting information on historical financial performance is an important information source with regards to investment risk. The income statement receives the most attention from the analysts in our sample, followed by the cash flow statement. In line with Graham et al (2002), we find that the cash flow statement is informative for analysts as an indicator of earnings quality, which is relevant also in the context of investment risk. High operating cash flows and high cash conversion indicate that earnings are recurring and stable, making them more reliable indicators of future earnings. Less attention is devoted to the balance sheet and most analysts in our sample are skeptical

towards the informativeness of assets' book values. However, the analysts often use the balance sheet to evaluate financial leverage, which is incorporated in the holistic risk assessment, implying that they consider the balance between operational and financial risk.

5.3 Holistic perspective on investment risk

We find that analysts evaluate investment risk from a holistic and company-specific perspective, implying that they primarily look at fundamental factors related to business performance. In line with the findings of Imam & Spence (2016), companies with business models that generate recurring earnings are seen as less risky. The analysts highlight the importance of historical accounting information such as earnings-stability, earnings margins and stability in earnings margins as important risk factors. They also incorporate factors that are more qualitative in nature such as management, competitive advantage, competitors, market characteristics and regulatory issues. Drawing on the results from Barker (1999), we find that risk is seen by analysts as the uncertainty in how these factors will affect future company performance. For example, if a company has had volatile earnings historically, future earnings are more difficult to predict, implying that investment risk is higher. Similarly, if a company lacks a clear competitive advantage, there is a higher risk that its market share will erode in the future, also meaning that investment risk is higher. Thereby, from the analysts' perspective, the fundamental factors that determine investment risk are the same as those that determine expected return. Further, we find that analysts evaluate risk factors in conjunction with each other rather than separately, to form an aggregated opinion. Thereby our findings are in line with those of Barker (1999) on fund managers, in that also for sell-side equity analysts, risk evaluation is an implicit part of the analysis and valuation process and part of the holistic view of a company.

However, most analysts in our sample emphasize that, even though the two often intertwine, they are stock analysts rather than company analysts. Thereby, in line with Barker (1999), we find that sell-side equity analysts also account for valuation-risks related to the price performance of stocks. Similarly to Imam & Spence (2016), we find that, when analyzing companies, many analysts only consider information that they believe will influence stock prices, independently of the effect on intrinsic value. In combination with the analysts' short recommendation horizons and their perception that the market is short-term oriented, this implies that risks that may materialize in the more distant future are given less attention. The short-term perspective is further accentuated by the inherent uncertainty and low visibility of

future conditions, along with the perceived importance of basing arguments on reliable and credible information. Many analysts in our sample thereby prefer to examine risk factors that can affect companies over a 2-3 year period, where the visibility is higher. In sum, risks associated with fundamental factors that affect intrinsic value are the analysts' focus, but due to the dynamics of the stock markets and issues with visibility, they are mostly examined from a short-term perspective.

5.3.1 Historical return volatility provides limited information

In line with the quantitative study by Lui et al (2007), which found that the CAPM-beta has little influence on analysts' risk ratings, all analysts in our sample have revealed skepticism to using a return-based measurement of investment risk. The majority of the analysts are uncertain as to how the historical returns should be interpreted since they are difficult to contextualize and comprehend without knowledge of the underlying drivers. As discussed previously, it is important for the analysts in our sample to understand the underlying reasons behind incurrences and motivate their predictions of the future with well-founded arguments. Further, there is a perception among many analysts that the market is inefficient and that historical returns are affected by noise such as stock price movements that are unrelated to intrinsic value or the illiquidity of certain stocks.

In contrast to the assumptions underlying the CAPM (Sharpe, 1964), our findings indicate that analysts generally have an idiosyncratic rather than portfolio perspective when assessing investment risk. As discussed above, the analysts in our sample evaluate risk from a company-specific perspective based on fundamental factors. The analysts don't consider that it's their job to evaluate the risk exposure of their clients' portfolios, but rather to contribute with risk information on individual companies. This is also in line with the findings of Lui et al (2007), which found that idiosyncratic risk better explains analysts' risk ratings.

5.4 Incorporating risk information into valuation models

The empirical data in this study support the findings in Imam & Spence (2016), Imam et al (2008) and Barker (1999), in the sense that analysts rely to a high extent on subjective judgment rather than quantification when they handle risk in valuations and analyses. Regardless of the valuation model used, a significant majority of the analysts in our sample stress the unquantifiable nature of several types of risk, implying that a more holistic and subjective approach based on their experience is regarded as necessary. In line with this, when

they apply the DCF-model, the explicit risk adjustment is characterized by *approximation* rather than *estimation*. However, in contrast to both previous research and the perception of the majority of analysts in our sample, we find that a few analysts quantify fundamental risk factors into an explicit estimate of the cost of equity capital. The way that investment risk is incorporated into the different valuation models will be further analyzed below.

5.4.1 Multiple valuation - Risk evaluation on a relative rather than absolute basis

We find that, in the context of investment risk, many analysts perceive multiple-valuations to be advantageous since they allow risks to be managed in a relative rather than absolute setting, as indicated in (Bancel & Mittoo, 2014). In line with their holistic view, this approach implies that the analysts can compare companies' risk-profiles to their peers instead of quantifying each specific risk component. Thereby the analysts determine a premium or discount on the multiple based on their holistic view of a company, which incorporates the risk-profile implicitly. Generally among the analysts in our sample, there is no standardized way of doing this, and it rather depends on each analyst's subjective judgment and opinion on how the market prices certain attributes. This is consistent with the findings in the quantitative study by Yin et al (2014), which showed that riskier firms are assigned lower valuation multiples.

Most analysts in this study thought that risk information could be extracted both from peers' trading multiples and from firms' historical trading multiples. This is consistent with the findings in the quantitative study by Yin et al (2018), which emphasized that these benchmarks help determine the valuation-multiple and inherently incorporate risk information. Several of the interviewees confirmed that these types of benchmarks are supportive for their understanding of how the market currently values and previously has valued equities with certain risk characteristics. In line with how Yin et al (2018) discussed their quantitative findings, our empirics show that peers' trading multiples are perceived as informative to analysts about how companies that are exposed to similar risks are valued by the market. The analysts' evaluation is often complex in the sense that they may apply sum-of-the-parts valuation, which enables a constellation of different risk characteristics to be incorporated into the valuation.

Regarding historical earnings-based multiples, similarly to the findings in Yin et al (2018), the analysts perceive that they are informative on valuation-risk, by showing how the price of an equity has fluctuated historically. However, to obtain valuable information from this type of benchmark, several analysts stressed the importance of understanding the historical context of the fluctuations and how it compares to the current economic environment. Our findings complement Yin et al (2018), in that we find that some analysts derive historical multiples also from the balance sheet. These analysts followed real-estate companies and they saw the B/M-ratio as informative on investment risk. Real estate assets are appraised at market value by external parties and the analysts thereby trust that the book value gives a reasonable estimate of their long-term value. The market price on the other hand fluctuates with expectations on real estate prices, meaning that the B/M-ratio provides information on short-term market sentiments.

However, somewhat in contrast to the findings in Yin et al (2018), the analysts in our sample perceive that only limited risk information can be attained from index multiples. While some analysts argued that the index multiple can be used to understand the valuation-risk of the entire market, they, as previously discussed, regard company-specific risks as more important. Since the analysts don't see it as their job, and beyond their ability to make forecasts of entire markets and sectors, they instead focus on risks that threaten a company's performance in relation to its sector. The index multiple is therefore rather referred to as a way of checking that valuations lay within reasonable boundaries and does not have meaningful influence on risk assessments.

5.4.2 Return-based *approximation* of the cost of equity capital

As stated above, most analysts in our sample rely on the DCF-model as a verification of valuations that are anchored in multiples. In line with the findings in the content-analysis study by Markou & Taylor (2014) and the survey-based study by Pinto et al (2015), these analysts rely on the CAPM for quantifying investment risk by calculating the cost of equity capital. However, similarly to how risk is incorporated in multiple-valuations, the explicit risk calculation is characterized by *approximation* rather than *estimation*. As previously discussed, the analysts are skeptical to the financial theory behind the CAPM, and primarily use the model since it is widely accepted in the industry rather than a sense of appropriateness. The calculation of the cost of equity capital is therefore not of significant interest to most analysts and is seen as a less important part of the valuation. Further, our findings are in line with

Brotherson et al (2013) in that the model is generally applied without much thought or reflection through a standardized approach, where subjective adjustments based on the holistic view of a company are made if deemed necessary. Thereby, the significant dispersions in how analysts' determine the input factors in the CAPM that were observed in Green et al (2016) and Markou & Taylor (2014), can, in light of our empirical data, be interpreted as a consequence of analysts applying the model in an arbitrary way and relying on subjective judgment in the process.

In accordance with the analysts' preference for valuations that are relative rather than absolute, and their objection to letting the cost of equity capital have substantial influence on valuations, many analysts in our sample who are sector-specific use a rate which is the same or very similar across the companies that they follow. However, as valuations are performed on enterprise level, the WACC may still differ since it also incorporates financial leverage and cost of debt.

5.4.2.1 Approximating the beta

Despite the analysts' skepticism to historical return-volatility as informative on investment risk, they all use backward-looking betas from external sources in their DCF-valuations and reveal no deeper motivation on their choice of time period. This can be interpreted in light of the general approach under which they apply the CAPM, without much reflection on the input factors. Similarly to how Barker (1999) found that analysts tend to approximate calculations, the analysts in our sample used volatility-based betas from external sources out of convenience rather than accuracy.

In nuance to the previously referenced studies and in line with their ambition of having a similar cost of equity capital across companies in the same sector, most analysts in our sample rely on sector betas rather than company-specific betas. These betas are often adjusted based on the analysts' subjective opinion on how companies' holistic risk profiles differ with regard to the fundamental and valuation-risk factors that have been discussed above. However, the adjustments are generally kept small to prevent the cost of equity capital from having too much influence on the valuation. We further find that, when determining beta, the analysts largely ignore financial risk, since sector-betas generally aren't adjusted for financial leverage.

5.4.2.2 Approximating the risk-free rate and market risk premium

In consistence with the findings of Green et al (2016) and Markou & Taylor (2014), the analysts in our sample generally estimate the risk-free rate based on the yield on government bonds. However, most of the analysts in our sample use rates that have been adjusted due to the exceptionality of the current interest rate environment, which is in line with the recommendations by Koller et al (2015). The analysts were aware of the sensitivity of valuations to the risk-free rate, as illustrated in Green et al (2016), and thought that it was important that the rate was not changed too often since it shouldn't be a driver of valuations.

The risk-free rate and the market risk premium are often determined centrally at the institutions where the analysts work. These factors are related to the overall economy rather than specific companies, and as previously discussed, the analysts don't view it as their job to have opinions on such issues. In line with this, the market risk premium is often based on capital market surveys like PWC (2017), implied historical rates or a combination of the two. Given that most analysts in our sample value companies in relation to their sector and account for market sentiments in doing so, it is logical that the market risk premium they use is based on the expectations of market participants. Despite this, several analysts in our sample adjust the market risk premium arbitrarily to obtain a cost of equity capital that better aligns with their holistic risk assessment.

Overall, our findings indicate that the dispersions in how analysts estimate the risk-free rate and the market risk premium that were observed in Markou & Taylor (2014) and Green et al (2016) could be caused by a perceived lack of importance of cost of equity calculations, arbitrary adjustments and the use of different information source and benchmarks.

5.4.3 Fundamental-based *estimation* of the cost of equity capital

In distinction to previous studies, where analysts solely have been found to use return-based measurements of investment risk (Markou & Taylor, 2014; Brotherson et al, 2013; Pinto et al, 2015), a minority of the analysts in our sample quantified fundamental factors into an explicit risk measurement. Similarly to the rest of the sample, these analysts focused on fundamental and company-specific factors when assessing investment risk. However, they used the fundamental information as exogenous factors to proprietarily developed models, which calculated the cost of equity capital in a similar way as proposed in Nekrasov & Shroff (2009) and Lyle et al (2013). The proprietary models use the same logic, but rely on less

sophisticated calculative methods as the models proposed in these studies. While fundamental-based risk measurement has been discussed in academia during the last decade, this is to the best of our knowledge the first study that shows that some sell-side equity analysts employ versions of such models in practice.

In line with Beaver et al (1970) and Nekrasov & Shroff (2009), this study shows that accounting information plays a vital role in the fundamental-based measurement of risk, even though other risk factors also are incorporated. The analysts in our sample who employ these models regard historical financial statement information as informative on the risk in future returns. In particular, historical profitability and earnings stability are important input factors in the proprietary models, but they also rely on other accounting data such as capital expenditures and financial leverage. As discussed by Penman (2010), an objective of accounting standard setters (IASB and FASB) is that accounting should serve to forecast future levels of cash flows (i.e. returns on investment). Indeed, our empirical data support that many analysts perceive that there is a stronger connection between investment risk and accounting information than non-primitive measurements of historical returns. We find that this holds true even for many analysts that cover larger companies (mid- and large-cap), in which there should be less issues with regards to stock liquidity.

While the academic discussions only have covered fundamental factors in terms of accounting information (Nekrasov & Shroff, 2009; Lyle et al, 2013), this study shows that analysts may also incorporate more qualitative information into the explicit risk measurement. Based on our empirical findings, qualitative factors are especially important for analysts who cover micro- and small-cap companies, where historical financial information is perceived to be a less reliable indicator of future performance. In particular, these analysts emphasized quality of management as a significant input factor to their proprietary model. This relates to the previous discussion on social capital (Imam & Spence, 2016), in that the quantification of management quality when estimating the cost of equity capital further emphasizes the importance of social capital for evaluating risk in small companies.

5.4.4 Company size is a prominent risk factor

Nearly all analysts in our sample consider company size to be a prominent risk factor, where small stocks are perceived as riskier than large stocks, which is consistent with the empirical results in Fama & French (1992). Similar findings were made in the quantitative studies by

Lui et al (2007) and Joos et al (2016) on analysts' risk ratings and scenario-based valuations, but this study can offer some insights into the underlying reasons behind the size adjustments. We find that analysts adjust valuations for size since small stocks are perceived as less liquid than large stocks, small companies are subjected to greater fundamental risks than large companies and because it is a generally accepted adjustment within the industry of sell-side equity research.

Most of the analysts in our sample account for stock liquidity when evaluating investment risk, where illiquid stocks are perceived as riskier for investors. This can be interpreted as the analysts' clients often being mutual funds and therefore exposed to valuation-risk in that they can be forced to sell stocks based on cash outflows from the fund, even at prices below their intrinsic value. While the analysts may assess the liquidity of a stock independently, size is commonly viewed as a suitable proxy, where small stocks are seen as less liquid. Further, the analysts in our sample perceive that small companies face greater business risks than larger ones, and are thus exposed to greater fundamental risks that influence intrinsic value. This has a multitude of causes, among them that small companies generally are characterized as having smaller product offerings, being more vulnerable to competitor attacks and more sensitive to economic downturns. Finally, several analysts in our sample make size adjustments without reflecting on the reasons for doing it, implying that for these analysts it is rather an inherent part of a general approach to valuations.

5.5 Scenarios and discussions for conveying information on investment risk

Our findings show that some sell-side equity analysts use scenarios in their reports to convey information about investment risk. These analysts think that valuations are too uncertain to be informative if alternative scenarios are not also covered, implying that scenarios are used as a way of testing assumptions. Further, we find that, in line with Joos et al (2016), scenarios are used by some analysts as a way of signaling higher investment risk through a larger spread between them. In addition, similarly to what was discussed in Damodaran (2013), we find that scenarios are especially useful to analysts in valuation cases where discrete risks are high. The analysts in our sample who cover companies within health care, that are often heavily dependent on research projects and regulatory approval, are more likely to rely on scenarios to capture the valuation effects of these binary outcomes.

However, many of the analysts in our sample don't convey risk information by explicitly stating scenarios, since they think that it's important to have a clear opinion about the stock in their reports. Nevertheless, they still rely on them in a more informal way by discussing with their clients how changed assumptions and uncertain events could affect the stock's value. While the scenarios are not quantified into target prices, they still form part of the holistic and subjective view of a company. This relates to that many sell-side analysts primarily view themselves as a discussion partner and information source for buy-side clients, which can be interpreted in light of the findings in Imam & Spence (2016), as that context and arguments are valued higher than precision and quantification.

6 Conclusions

In this section we summarize our findings and answer the research question. We also discuss some of the study's limitations and provide suggestions for future areas of research.

6.1 Contributions

This study explores how sell-side equity analysts incorporate investment risk when analyzing and valuing common stocks. While previous research shows that equity analysts contribute with information on investment risk (Lui et al, 2007; Joos et al, 2016), these quantitative studies don't investigate the analysts' underlying thought processes and the more subtle reasoning that explains their behavior. Additionally, Schipper (1991) and Bradshaw (2011) have called for more research on how equity analysts process and translate information into valuations. Through the means of an interview-study covering analysts' explicit risk adjustments as well as the more embedded adjustments, we gain a holistic perspective of how risk information is translated into valuations and analyses.

In line with the findings of Barker (1999) on fund managers, our findings indicate that most sell-side equity analysts regard risk as an implicit and embedded part of the holistic view on a company. For this reason, many analysts perceive risk as unquantifiable, implying that they rather rely on subjective judgment and their deeper knowledge of companies and industries when making risk assessments. Similarly to the findings in Barker (1999), the analysts in our sample conceive that uncertainty in the fundamental factors that affect business performance is the primary component of investment risk. However, these factors have to be considered in light of market sentiments, and are thereby primarily evaluated from a short-term perspective. As suggested in previous research (Beaver, 1970), accounting information plays an important role in assessing fundamental risk factors. The analysts in our sample extract risk information in particular from the income statement, by reviewing the volatility and level of earnings and earnings-margins. However, the cash flow statement is also important, since in conjunction with the income statement it is informative on earnings quality, similarly to what was found in Graham et al (2002).

While many analysts in our sample think it is important to have a clear opinion on the future performance of a stock or company in their reports, they discuss alternative scenarios with

their clients as a way of conveying risk information. In line with their holistic view on risk, rather than quantifying different assumptions into separate scenarios, these analysts discuss how certain outcomes and making alternative assumptions would affect the value of a stock. Similarly to the findings in Imam & Spence (2016), we thereby find that also in the context of investment risk, several analysts experience that *context* is more important than *precision*, since their clients value getting access to their deeper knowledge of potential threats to companies and industries more than the target prices that they explicitly calculate.

In line with previous research (Pinto et al, 2015; Markou & Taylor, 2014; Bancel & Mitto, 2014), our findings indicate that most sell-side equity analysts rely on the CAPM when calculating the cost of equity capital. However, we provide a more nuanced perspective by showing that due to their skepticism of the model, many analysts apply it in a standardized way without much reflection on the input factors. Thereby the explicit risk adjustment is characterized by *approximation* rather than *estimation*.

In distinction to previous research, we further find that a few institutions have developed proprietary models for estimating the cost of equity capital. Consistent with many analysts' perception of investment risk, these models incorporate fundamental risk factors rather than being based on historical stock returns. Previous research has confirmed the validity of accounting-based models for quantifying investment risk (Nekrasov & Shroff, 2009; Lyle et al, 2013), and this study shows that some sell-side equity analysts use similar models in practice. However, in addition to accounting information, the proprietary models have also been found to incorporate more qualitative information into the explicit risk measurement. In particular in the context of small companies, a few analysts regard management quality as an important risk factor to include in the model.

We believe that our conclusions are relevant for several stakeholders. The way that investment risk is incorporated into valuations affects how the market prices securities, implying that those involved in capital market research would find the study interesting. In addition we believe that fund managers who rely on sell-side equity analysts' advice and recommendations, would find further insights into their thought processes valuable.

6.2 Limitations

The conclusions from our research should be interpreted in light of several limitations. Most importantly, the analysts that we have interviewed have been chosen from purposive rather than random sampling, implying that they may not be representative for a wider population of analysts. Further, interview-studies come with the inherent limitation that they are reliant on the interviewees' description of their behavior, rather than observations of their actual behavior. The way that the analysts have depicted their behavior could be influenced by factors such as a desire to come across as knowledgeable on investment risk and a struggle to remember certain things. We have tried to mitigate these limitations firstly by speaking to analysts from 13 different institutions and secondly by establishing trust with the analysts and asking open-ended questions.

We also draw certain conclusions about how the relationship between sell-side analysts and their buy-side clients affects the way that investment risk is incorporated into valuations and analyses. However, it is important to remember that our conclusions rely solely on the perceptions of sell-side analysts. Given that we have not spoken to buy-side analysts or fund managers we cannot draw any conclusions on their perspective of sell-side research.

6.3 Suggestions for future research

While this study is limited to how sell-side equity analysts handle investment risk in their analysis and valuation of stocks, they are not the actual investors. As mentioned by several analysts and in previous research (Schipper, 1991), institutional investors' comprehension about the riskiness of a stock is formed by a multitude of sources, of which sell-side research is an important one. While sell-side analysts transfer information, a significant part of which is qualitative, fund managers are responsible for processing and translating it into a buy, hold or sell decision. An interesting topic for future research is therefore to study how fund managers manage investment risk. This is especially relevant given that, since fund managers invest in a multitude of stocks, they must to a higher extent consider a portfolio perspective.

In addition, given that our research shows a prevalence of accounting- and fundamental-based models for calculating the cost of equity capital among practitioners, further empirical tests of the validity of such models would be valuable. Of particular interest would be empirical tests of fundamental-based models that also incorporate qualitative factors such as quality of management and management ownership.

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8 Appendix

8.1 Interview guide

Part 1) Background questions:

- For how long have you worked as an equity analyst?
- Which sectors do you cover?
- How many companies do you cover?
    - What market cap do they have?
- Who are your customers?
    - Who reads your reports?
- How do you present your analyses to the customer?

Part 2) General questions on valuation:

- Could you tell us about how you perform company-valuations?
- Do you calculate a target price?
    - Is it important?
- Which valuation models do you use and why?
    - Do you always use the same models?
- Which information do you think is most important for company-valuations and why?
    - Which accounting information?
- How far into the future do you make explicit forecasts?

Part 3) Managing investment risk:

- How do you think about investment risk?
- Which risk factors do you consider when performing company-valuations?
- How do you account for risk when applying valuation models?
- To what extent is risk quantifiable?
- How do you think about risk when you assess a company's growth prospects?
- What time horizon do you consider when assessing risk and why?
- Do you calculate an explicit cost of capital?

- If so, how?

- What are your thoughts on the CAPM?
  - If you apply it, how?
  - What is important to think about when applying the model?
  - How do you determine beta and why?
  - How do you determine the risk-free rate and why?
  - How do you determine the market risk premium and why?
- Have you ever calculated a cost of equity that you thought was unreasonable?
  - How did you deal with that?
- Do you rely on scenarios in your forecasts (bear, bull, base)?
  - If so, do they help you with your risk-assessment?
  - If there is a large spread between the scenarios, what are your thoughts on that?
- Do you feel that your clients request risk information?
  - If so, in what way?
  - How do you communicate risk information to your clients?