An empirical study of the discounted cash flow model

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Abstract

The purpose of this thesis is to compare the practical use of the DCF model with the theoretical recommendations. The empirical study is based on eight different DCF models performed by American, European and Nordic investment banks on the Swedish retail company Hennes & Mauritz (H&M). These models are currently being used internally by the corresponding equity research departments to determine the fair value of the H&M stock. The aspects that are studied are regarded as the basic theoretical requirements of the DCF model. The discrepancies between theory and practice are concluded to be significant and the overall quality of the studied DCF models is determined to be poor. The explanation for the differences between theoretical practice and empirical findings is mainly attributed to the use of the DCF model as a tool to merely motivate an investment recommendation and not derive a correct theoretical value.

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1. Introduction

The theoretical literature on corporate valuation is both extensive and publicly available. How corporate valuation is performed in practice is however often protected as a secret. Professional financial analysts (Analysts) use various techniques to calculate the value of a firm.[4] The value that is derived is used to advice clients in their investment decisions. Without access and understanding of how the Analyst reached a certain value it is difficult to determine the quality and the rationale behind the advice. This thesis intends to analyze how corporate valuation is performed in practice through an empirical study. The empirical findings will be compared with theoretical recommendations in order to determine the quality of the corporate valuation models that are used in practice.

This paper will focus on is the Discounted Cash Flow (DCF) model, which is the dominant valuation method in firm valuation (Lundholm and O'Keefe 2001).[5] The extensive practical use of the DCF model in firm valuation has been documented in earlier studies such as Hult (1998) or Demirakos et al (2002). In order to fully comprehend the findings of this study a thorough understanding of the DCF model is necessary.[6] It is assumed in this thesis that the reader has an understanding of the DCF model described in *Valuation: Measuring and Managing the Value of Companies* by Koller et al (2005).

1.1 Purpose and contribution

The purpose of this thesis is to compare the practical use of the DCF model with the theoretical perspective. This will be done through an empirical study of eight different DCF models performed by American, European and Nordic investment banks on the Swedish retail company Hennes & Mauritz (H&M).

During the authors' studies at the Stockholm School of Economics (SSE), and during the process of writing this thesis, we have encountered extensive theoretical information on how to value a company. However, what is currently being done in practise is often secretive and therefore rarely available to the public.

To the best of the authors' knowledge, this is the first study that performs an empirical study of different DCF valuations on a single firm. The DCF models included in this study are

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[4] The academic literature has suggested several different valuation models for firm valuation. See Skogsvik (2002) for an introduction to the Residual Income Valuation (RIV) and the Value Added Valuation (VAV) models. In addition see Penman (2007) pp.120-122 regarding the Dividend Discount model (DDM). Fernández (2002), Levin (1998a) and Penman (1998) present in their papers earlier academic studies how equivalence can be achieved between different valuation models.

[5] Firm valuation is in this thesis defined as a valuation that aims at determining the fair value of a company's equity.

[6] See Jennergren (2007a) for an introduction to the DCF model. For a practical example of a DCF model see the McKay case in Jennergren (2007a) or the Höganäs valuation in case in Jennergren (2007b).

currently being used in practice by the equity research departments in the different investment banks to determine the target price of the H&M stock. It is believed that the thesis will provide new valuable insights about the practical use of the DCF model in firm valuation. The research questions this thesis intends to answer is:

How does the practical application of the DCF model differ from theory?

1.2 Delimitations

Through choosing only one target company and by comparing how different DCF models are constructed we believe that it will be more evident what the differences and similarities are between practice and theory. As a result the conclusions of the practical use of the DCF model can hopefully be made more general.

There are several reasons why H&M has been chosen as the target company in this study. In terms of Market Capitalization H&M is currently the largest company on the Swedish Stock Exchange with a large quantity of domestic and international shareholders. As a result the firm is covered by many different Analysts at investment banks. Therefore it was assumed that it would be possible to gather the necessary data to perform this study. Furthermore, the operations of the company allow for the DCF model to be applied properly.

However, the reader should notice that H&M does not hold any long-term interest bearing liabilities which is unusual when performing a DCF valuation. The *net debt* of H&M is therefore currently negative which will have some practical implications when conducting a DCF valuation.[7]

1.3 Outline

The rest of the thesis is organized as follows. Section 2 will describe the data and methodology for the empirical study. The relevant theoretical framework will be presented in section 3. The findings of the empirical study will be reported in section 4 and discussed in section 5. Potential explanations to the empirical findings are provided in section 6. Finally, we summarize and conclude our findings as well as present implications for future research in section 7.

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[7] *Net debt* is defined as debt minus financial assets. In the case of H&M the financial assets are greater than the firm's debt.

2. Data and methodology

This section will first present the data that is used in the empirical study. Thereafter the methodology for how the empirical data was collected and how the empirical study was performed will be explained.

2.1 Data

The H&M stock is currently being covered on a daily basis by approximately 16 different investment banks. From these we were able to gather in total eleven valuation models. Three of these investment banks did not use the DCF model when valuing the H&M stock and therefore those models were discarded. Hence, the empirical data consist of eight different DCF models by top-tier American, European and Nordic investment banks. These models are currently being used internally by the equity research departments at the investments banks to determine the *fair value* of the H&M stock.[8] Thus, the buy, hold or sell recommendations that can be viewed in any equity research report is to a large extent being determined by these models.

The empirical data used in this study account for the majority of the valuation models, performed by investment banks, which cover the value of the H&M stock on a daily basis. From the authors' point of view the empirical data that has been gathered is both extensive and unique.

2.2 Methodology

Two of the studied DCF models were collected from an online database that provides subscribers with access to equity research from some of the leading investment banks.[9] The additional DCF models were gathered from the individual Analyst that covers the H&M stock at different investment banks.

There were two conditions from the Analysts in order to share their DCF models. The first condition was complete anonymity both regarding the name of the Analyst and the investment bank he or she works for. The second condition was a promise from the authors that the DCF models would not be displayed in any form or passed on to any other part.

In the interest of the reader and given the magnitude of the models certain limitations regarding the empirical study have been made. Given the purpose of this thesis, we have chosen to empirically study the aspects that according to theory are considered most important.

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[8] *Fair value* or *target price* is in this thesis defined as the corresponding value of the firm's equity or stock price derived using the DCF model.

[9] Due to property rights of the contents on the website we are not allowed to mention the name of the website in this thesis.

The following aspects were chosen to be included in the empirical study:

- To what extent is historical data used in the models?

- How are forecasts being made?

- How is the discount rate calculated and accounted for?

- Is the company truly in a steady state after the final year of the explicit forecast period?

- Does the free cash flow match the financial cash flow?

- Is it possible to change the assumption of expected future inflation?

- What is the implied interest rate on excess marketable securities and is it reasonable?

- How does the model take into account the changes in expected future exchange rates?

3. Theoretical framework

The following section will present the theoretical recommendations on each aspect that was included in the empirical study.

3.1 Analysis of historical performance

A crucial step in the DCF model is to collect and analyze relevant historical information in order to evaluate the historical performance. A solid understanding of the past performance will enable reasonable forecasts of future performance.

The historical information should at a minimum include income statements and balance sheets. Additional information such as cash flow statements and relevant notes may also add value. The number of years of historical data included should be sufficient to determine historical performance and business trends.

In order for the historical information to provide an understanding of historical performance it needs to be analyzed. The analysis is performed through calculating historical financial ratios such as sales growth, profit margins, capital expenditure etc.[10] Through analyzing these ratios over a number of years the historical performance will become evident and reasonable assumptions regarding future performance can be made (Jennergren 2007a).

3.2 Forecasting future performance

The analysis of the historical performance should provide a clarifying connection to the assumptions that are made regarding future performance. These assumptions should be able to generate future expected income statements and balance sheets from which the free cash flow can be derived. Furthermore, the assumptions should be clearly stated in a separate section.

The forecasting of a firm's financial performance is divided into two periods: the *explicit forecast period* and the *post-horizon period*.[11] For each given year in the explicit forecast period the corresponding income statement and the balance sheet is used to derive the expected annual free cash flow.

In some implementations of the DCF model it is a requirement that the explicit forecast period is not shorter than the economic life of the firm's property, plant and equipment (PPE), (Jennergren 2007a and Jennergren 2008). According to Jennergren (2007a) and Koller et al (2005) the explicit forecast period should consist of at least 10-15 years. Earlier studies have however

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[10] *Sales growth* is defined as change in sales/sales$_{t-1}$. *Profit margin* is defined as operating income (after tax)/sales. *Capital expenditure* is this year's net PPE minus last year's PPE plus this year's depreciation.
[11] During the *explicit forecast period* the firm transform into a steady state. The firm has reached the steady state in the *post-horizon period*.

concluded that practitioners often use a shorter forecasting period, often no longer than five years (Levin and Olsson 1995 and Barker 1999).

Through forecasting entire income statements and balance sheets an analysis using financial ratios is possible. This analysis can be used to determine the fairness of the assumptions regarding the future (Levin 1998b).

3.3 Estimating the cost of capital

The discount factor for the free cash flows must represent the risk faced by all investors. The weighted average cost of capital (WACC) combine the required rates of return for net debt (r_{nd}) and equity (r_e) based on their market values.[12] The tax effect on cost of net debt is accounted for in the WACC. Through using a constant WACC it is implicitly assumed that the capital structure will remain unchanged.[13] The WACC is defined as follows:

$$WACC = \frac{ND}{ND+E} r_{nd}(1-T_c) + \frac{E}{ND+E} r_e$$

The components of the WACC should be calculated accordingly:

- The cost of net debt should be calculated using the company's yield to maturity on its long-term debt.

- The marginal tax rate should be used as the tax rate in the WACC formula, which is the tax that the firm would pay if the financing or nonoperating items were eliminated.

- For mature companies, the target capital structure is often approximated by the company's current debt-to-value ratio, using market values of debt and equity.

- The Capital Asset Pricing Model (CAPM) is used to determine the required rate of return on equity:[14]

$$E(r_e) = r_f + \beta \times \left[E(r_m) - r_f \right]$$

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[12] See Grinblatt and Titman (2002) ch. 13 or White et al (2003) pp. 194-198 for a more extensive explanation of WACC.
[13] If the firm's capital structure is expected to change in the future the adjusted present value (APV) method is instead recommended. The APV method was first introduced by Myers (1974). In an APV-based valuation the firm is valued as if it were all-equity financed. The free cash flows are discounted by the unlevered cost of equity (what the cost of equity would be if the company had no debt). In addition to this value the value created by the company's use of debt is added (the value of the tax shield). For an example of an APV valuation see the Gimo AB valuation by Jennergren and Näslund (1996).
[14] A more extensive description of the CAPM model can be found in Bodie et al (2008). Other well-know models besides CAPM include the Fama-French three factor model and the arbitrage pricing theory (APT). See Levin (1998b) regarding a discussion on earlier academic studies on the Fama-French and APT models as well as recent empirical criticism of the CAPM model. Tbe Fama-French three factor model was first presented in Fama and French (1993) while the APT method was introduced by Ross (1976).

CAPM should be calculated accordingly:

- Local government default-free bonds should be used to estimate the risk-free rate. Ideally, each cash flow should be discounted using a government bond with a similar maturity.

- To estimate the beta, first measure a raw beta using regression which should at least contain five years of monthly returns and then improve the estimate by using industry comparables.

- No single model for estimating the market risk premium has gained universal acceptance. Based on evidence from the different used models suggests a market risk premium around 5 percent (Koller et al 2005).

One should note that, given the WACC formula, it is possible to use the required return on equity as the discount factor if it is assumed that the future target capital structure will be 100 percent equity and 0 percent net debt. A net debt of zero requires that the model assumes that no interest bearing liabilities or financial assets will exist in the target in the future, in this case the tax rate become irrelevant in the WACC.

3.4 Estimating the continuing value

As already mentioned the forecasting of a firm's financial performance is divided into two periods: the explicit forecast period and the post-horizon period.[15] During the explicit forecast period the firm is expected to transform into a steady state. When the firm has reached the steady state the terminal value is calculated by a continuing value formula.

The continuing value formula is applied to the first year in the post-horizon period which therefore becomes representative for all subsequent years in the steady state. The explicit forecast period must be long enough for the company to reach a steady state. According to Koller et al (2005) the following characteristics must be fulfilled in order for a company to truly be in steady state:[16]

- The company should grow at a constant rate and reinvests a constant proportion of its operating profits into the business each year.
- The company earns a constant rate of return on new invested capital.
- The company earns a constant return on its base level of invested capital.

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[15] Note that the term *continuing value* or *horizon value* is sometimes used instead of terminal value in the valuation literature.
[16] See Hess et al (2008) pp. 8-11 for alternative definitions of the steady state in empirical studies.

If these conditions are fulfilled in steady state the free cash flow will grow at a constant rate consistent with the assumed terminal growth rate and thereby a continuing value formula can be applied.[17] The DCF model should be constructed in such a way that an extra year in steady state could be added, this enables to verify if the company truly is in steady state, since the free cash flow during the extra year is supposed to grow with the terminal growth rate (Jennergren 2007a).[18]

The continuing value formula that is commonly recommended is the Gordon growth model.[19] It should be noted that even though the terminal value is calculated by a simple Gordon growth model it does not imply that it is unimportant and irrelevant for the value of the firm (Levin and Olsson 2000). Earlier studies have shown that a significant part of the total firm value is in the terminal value (Levin and Olsson 1995). In addition, recent empirical studies have indicated that the terminal value calculations are crucial for the overall accuracy of a valuation model.[20]

The terminal growth rate in steady state must be less than or equal to that of the economy (the GDP growth). A higher growth rate would eventually make the company unrealistically large compared to the aggregated economy.[21] The growth rate is often assumed to equal the rate of inflation (Francis et al 1997).

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[17] Hence the free cash flows in any year t+1 will be described by $FCF_{t+1} = (1+g)*FCF_t$ where g is the constant growth rate. This is assumed to hold for all future years.
[18] For a practical example see the McKay case in Jennergren (2007a).
[19] See Brealey et al (2005) p. 65, Grinblatt and Titman (2002) p. 388 or Penman (2007) p. 128. Koller et al (2005) also suggest *the value driver formula*, see Koller et al (2005) p. 112.
[20] See Francis et al (1997) and Penman and Sougiannis (1997).
[21] Koller et al (2005) p.234.

3.5 Other aspects

The main crucial aspects, according to theory, when determining the quality of a DCF model have been presented above. However, the following aspects should be included in any DCF model and could in some models be critical for the model to run properly.

3.5.1 Financial cash flow

The *financial cash flow* consists of transactions to or from all investors in the firm.[22] Hence, the financial cash flows consist of all transactions with those providing capital to the firm. Financial cash flows should be identical to the free cash flows. Thus, through including the financial cash flows it is possible to check that the free cash flow calculations are correct. As a result it is possible to identify potential mistakes concerning the free cash flow calculations (Koller et al 2005 and Jennergren 2007a).

3.5.2 Inflation

The cash flows should be expressed in nominal terms (unless discounting real cash flows with a real discounting rate) and should reflect the expected real growth and the expected inflation (Kaplan and Ruback 1995 or Kaplan and Ruback 1996). When possible, derive the expected inflation rate from the term structure of government bond rates. The nominal interest rate on government bonds reflects investor demand for a real return plus a premium for expected inflation (Koller et al 2005). Jennergren (2008) recommend sales growth to be equal to the assumed real growth plus the expected inflation in steady state.[23]

3.5.3 Excess marketable securities

Excess marketable securities are by definition non-operating assets (Koller et al 2005).[24] These financial assets generate an interest income. The interest income (that can be viewed in the income statement) divided by the excess marketable securities in the beginning of the year (that can be viewed in the balance sheet) provides the annual interest rate on excess marketable securities. If the forecasts include entire income statements and balance sheets the implied interest rate on excess marketable securities can be derived using the same calculation. The implied interest rate on excess marketable securities test if there has been made reasonable

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[22] Financial cash flow: Increase (+)/Decrease (-) in excess marketable securities
                     After-tax interest income (-)
                     Increase (-)/Decrease (+) in short and long-term debt
                     After tax interest expense (+)
                     Common dividends (+)
                     Increase (-)/Decrease (+) in common stock
                     Financial cash flow

[23] This means that there is a nominal growth of sales revenue of $c = (1+g) \times (1+i) - 1$ in every year in the post-horizon period, where g is the assumed real growth and i is the expected inflation. In particular, the sales revenue in the first year of the post-horizon is $S(1+c)$, where S is the nominal sales revenue of the firm in the last year of the explicit forecast period.

[24] See Koller et al (2005) pp. 173-174 for a further discussion on *nonoperating assets*.

assumptions regarding the expected profitability of the financial assets. Logically, in perpetuity it should not be any higher than the return from the operations. If so, it would be more profitable to close the operations since the interest rate is higher than the return from continuing the operations (Koller et al 2005).

3.5.4 Currency forecasts

If the valuation target generates cash flows in different currencies the model should initially denominate the forecasted cash flows in their local currency (Estridge and Lougee 2007). Since the valuation is performed in one single currency the local cash flows must be transformed using exchange rates. Since exchange rates may change in the future it is important that the model permits changes regarding these assumptions. A company valuation should always lead to the same result regardless of which kind of currency the cash flows are projected. Koller et al (2005) recommend one of the following methods to forecast and discount foreign currency cash flows:

1. *Spot-rate method*: Project foreign cash flows in corresponding foreign currency and discount the cash flows at the foreign cost of capital.[25] Afterwards convert the present value of the cash flows into the domestic currency, using the spot exchange rate.[26]

2. *Forward-rate method*: Project the foreign cash flows in corresponding foreign currency and convert them into domestic currency using the forward exchange rate.[27] Afterwards discount the converted cash flows at the cost of capital.

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[25] As a result the foreign cash flows must be discounted at the corresponding foreign WACC.
[26] The *spot exchange rate* is equal to the current exchange rate.
[27] The *forward exchange rate* refers to an exchange rate that is quoted and traded in the market today but is for delivery and payment on a specific future date.

4. Empirical findings

This section will present the findings of the empirical study. The study was performed on eight different DCF models with H&M as the valuation target. There are eight different empirical aspects that are studied in each model. Each aspect that is accounted for in this empirical study has a corresponding theoretical recommendation in the previous section. The intention of this structure is to enable a clear comparison between theory and the empirical findings.

4.1 Historical information

According to theory there are three crucial features that determine the quality of how historical information should be used in a DCF model.

- The number of years of historical information included should be sufficient to determine historical performance and possible business trends.

- The extensiveness of historical information should at a minimum include income statements and balance sheets.

- The historical information should be analyzed through calculating financial ratios.

How each model takes these features into account is presented in the table below (Table 1).

Firm	Number of historical years	Type of historical information	How is the historical information used?
Firm 1	Two	Only fragmented parts from the BS and IS are displayed	No historical financial ratios are calculated
Firm 2	Four	Entire BS and IS are displayed	Historical financial ratios and cash flows are calculated in a precise and orderly manner
Firm 3	Nine	Entire BS and IS are displayed	Limited historical financial ratios are calculated. In addition they are combined with hard coded figures
Firm 4	Four	Entire BS and IS are displayed	Historical financial ratios and cash flows are calculated in a precise and orderly manner
Firm 5	N/A	N/A	N/A
Firm 6	Nine	Only fragmented parts from the BS and IS are displayed	Limited historical financial ratios are calculated. In addition they are combined with hard coded figures
Firm 7	Eight	Entire BS and IS is displayed but the information is not structured as financial reports	All data have been linked from an external database. No historical financial ratios are calculated
Firm 8	Eleven	Entire BS and IS data is displayed with notes included	Historical financial ratios and cash flows are calculated in a precise and orderly manner

Table 1: Historical information

Model 5 did not include any historical information and therefore could not be studied on this aspect.

The number of years of historical information included in the models varied from two to eleven years.[28]

Five models displayed entire balance sheets and income statements whereas the remaining two only displayed fragmented parts of historical information. The two models with fragmented historical information only displayed historical information that is included in the free cash flow calculation.

Five models analysed the historical information through calculating financial ratios whereas the remaining two did not perform any analysis of the historical data that they displayed in their model.

4.2 Forecasting procedure

Regarding the forecasting procedure, the following theoretical conditions are used to determine its quality.

- The number of years in the explicit forecast period should be at least 10-15 years.
- The forecasting should include entire income statements and balance sheets.
- The assumptions on future expected performance should be clearly linked from an analysis of historical financial ratios.
- The assumptions should be clearly stated in a separate section.

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[28] Note that the following abbreviations are used in the tables describing the DCF models: balance sheet (*BS*), income statement (*IS*), free cash flow (*FCF*), equity (*E*), net debt (*ND*), required return on equity (*Re*), risk-free rate (*Rf*), market risk premium (*Rm-rf*) and not available (*N/A*).

The empirical findings of these conditions are presented in the table below (Table 2).

Firm	Number of years in explicit forecast period	Information that is being forecasted	Assumptions of future performance linked from historical information?	Separate assumption section?
Firm 1	Three	Simplified BS and IS	No linkage from historical information, all numbers are hard coded	No
Firm 2	Nine	Entire BS and IS in detail	No linkage from historical information, all ratios are hard coded	Yes
Firm 3	Twelve	Three years of BS and IS. The remaining nine years are hard coded	No linkage from historical information, all ratios are hard coded	Yes
Firm 4	Three	Entire BS and IS in detail	No linkage from historical information, all ratios are hard coded	Yes
Firm 5	Twenty	Only FCF items are forecasted	No linkage from historical information, all ratios are hard coded	No
Firm 6	Five	Entire BS and IS in detail	Some linkage from historical information, mix of hard coded assumptions and ratios	No
Firm 7	Four	Simplified BS and IS	No linkage from historical information, all forecasts are derived from external data base	No
Firm 8	Nine	Entire BS and IS in detail	Some linkage from historical information, mix of hard coded assumptions	Yes

Table 2: Forecasting procedure

The number of years included in the explicit forecast period ranges from three to twenty years. Regarding this empirical finding it should be noted that the average life time of the PPE for H&M has been calculated to be ten years.[29]

Five of the models forecasted entire income statements and balance sheets; however, model three included a twelve year explicit forecast period but forecasted only entire income statements and balance sheets for the first three years. The remaining three models forecasted only fragmented items of the income statements and balance sheets, most commonly the items that are used in the free cash flow calculations.

Only two models displayed linkage from historical financial ratios to the assumptions on future expected performance. This linkage was not extensive in either of the models, only a few financial ratios were linked. The remaining six models mixed assumption with actual values in various sections of the model.

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[29] *Average life time of PPE* $= 1/ (\text{Depriciation}_t / \text{PPE}_{t-1})$.

Four models presented a separate assumption section from which forecasts where linked whereas the remaining four models did not have a separate assumption section.

4.3 Discount rate

According to theory the following calculations should be included to determine the WACC:

- The cost of net debt should be calculated using the company's yield to maturity.
- The marginal tax rate should be used as the tax rate in the WACC formula.
- The target capital structure is approximated by the company's current debt-to-value ratio.
- The CAPM is used to determine the required rate of return on equity.
  - Local government default-free bonds should be used to estimate the risk-free rate.
  - Beta is estimated by using a regression analysis.
  - The risk premium needs to be assumed, averaging 5 percent.

The following tables (Table 3 and Table 4) shows the empirical findings on how the discount rate was derived.

Firm	Calculation of discount rate	Discount rate	WACC weights	Rd (pre-tax)	WACC taxrate
Firm 1	WACC hard coded	8,0%	N/A	N/A	N/A
Firm 2	WACC formula	8,8%	109,6 % Equity - 9,6% ND	5,8%	31,7% (hist. tax rate)
Firm 3	Re hard coded	9,0%	100,0% Equity	N/A	N/A
Firm 4	WACC formula	8,5%	N/A	N/A	N/A
Firm 5	WACC formula	8,0%	100,0 % Equity	4,0%	30,0%
Firm 6	WACC formula	6,4%	100,0% Equity	3,5%	33,0%
Firm 7	WACC hard coded	8,2%	90,0% E and 10,0% ND	4,7%	N/A
Firm 8	WACC hard coded	8,0%	100,0% Equity	3,5%	N/A

Table 3: Calculations for the discount rate

Seven of the models clearly defined the WACC as the discount rate, whereas one model defined the discount rate as the required return on equity. Five models displayed how the WACC had been calculated and two models displayed hard coded values. The discount rate varied from 6,4 percent to 9,0 percent.

Only two models assumed a different target capital structure than 100 percent equity. One model assumed that H&M will take on interest bearing debt in the future and therefore assigned a weighting of 10,0 percent net debt and 90,0 percent equity. However, one model assumed that H&M will maintain a positive net debt in future years and therefore assigned a capital weighting of minus 9,6 percent net debt and 109,6 percent equity.

Furthermore, the required return on debt varied from 3,5 percent to 5,8 percent. The tax rate varied from 30,0 percent to 33,0 percent however these value are irrelevant in the case that net debt is assumed to be equal to zero.

Firm	Calculation of Re	Re	Beta	Rf	Rm-rf
Firm 1	N/A	N/A	N/A	N/A	N/A
Firm 2	CAPM	8,8%	1,0	5,5%	3,3%
Firm 3	CAPM	9,0%	1,0	4,0%	5,0%
Firm 4	N/A	N/A	N/A	N/A	N/A
Firm 5	CAPM	8,0%	1,0	4,0%	4,0%
Firm 6	CAPM	6,4%	0,8	3,2%	4,0%
Firm 7	CAPM	8,7%	0,9	4,2%	5,0%
Firm 8	N/A	8,0%	N/A	N/A	N/A

Table 4: CAPM calculations

When determining the required cost of equity five models used the CAPM formula while the remaining three hard coded the value. The values of the required return of equity varied from 6,4 percent to 9,0 percent. The difference in the values is displayed in Table 4.

4.4 Steady state assumption

The theoretical recommendations regarding the calculation of the terminal value are the following:

- The model must be constructed in a manner so that true steady state can be determined.

- The company must be in true steady state for a continuing value formula to be applied, i.e. the free cash flows in steady state must grow at a constant rate consistent with the assumed terminal growth rate.

- The terminal growth rate in steady state must be less than or equal to that of the economy.

The empirical findings on how the terminal value was calculated in the different models were the following (Table 5):

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Firm	Possible to determine true steady state?	Has the company truly entered steady state?	Assumed terminal growth rate
Firm 1	No	N/A	3,50%
Firm 2	Yes	Yes	3,00%
Firm 3	Yes	No (error)	2,50%
Firm 4	No	N/A	3,00%
Firm 5	Yes	Yes	0%, no growth is assumed
Firm 6	Yes	Yes	3,00%
Firm 7	No	N/A	3,00%
Firm 8	No	N/A	3,00%

Table 5: Steady state assumptions

Four of the models were constructed in such a way that true steady state was able to be verified. The remaining models were built inconsistently and whether these models had entered true steady state is uncertain.

Three out of the four models that could be verified had truly entered steady state. However it is noticeable that one model failed the verification and could therefore be concluded to be improperly constructed. The reason was the growth of capital expenditures which did not match the terminal growth rate. Finally it could be noted that the terminal growth rate ranged from 0,0 percent to 3,5 percent.

4.5 Other valuation aspects

The theoretical recommendations were the following regarding the remaining studied aspects:

- **Financial cash flow:** Financial cash flows must be calculated and should be identical to the free cash flow.
- **Inflation:** Sales growth should be equal to the assumed real growth plus the expected inflation in steady state, i.e. the inflation should be an assumption input that is possible to be changed.
- **Excess marketable securities:** In perpetuity the implied interest rate on excess marketable securities should not be any higher than the return from the operations.
- **Exchange rate:** Cash flows in local currency should be denominated to one currency using changeable assumptions regarding future exchange rates.

The empirical findings on these aspects are presented in the table below (Table 6).

Firm	Existence of financial cash flow?	Possible to change inflation?	Interest income on excess marketable securities	Possible to change exchange rate assumptions?
Firm 1	No	No	Implies an interest rate around 4%	No
Firm 2	No	No	Implies an interest rate around 2,5%	Yes
Firm 3	No	No	Implies an interest rate around 10 %	Yes
Firm 4	No	No	Implies an interest rate around 3,7%	Yes
Firm 5	No	No	N/A	No
Firm 6	No	No	N/A	Yes
Firm 7	No	No	Implies an interest rate around 3,5 %	No
Firm 8	Yes, equal to FCF	No	Implies an interest rate of 3,5 %	Yes

Table 6: Other quality aspects

Only one of the studied models did display calculations of the financial cash flows and matched them with the free cash flows, all other models neglected to account for the financial cash flow and its matching with the free cash flow.

None of the studied models included assumptions regarding future inflation. All the models, except two, did forecast future interest income on excess marketable securities. The forecasts include assumptions regarding the future values of interest received and excess marketable securities, thus an implied interest rate can be calculated. The implied interest rate averaged around 4,5 percent. However, one of the models assumed an implied interest rate of

over 10,0 percent in perpetuity which is higher than the return on operations. Furthermore, all models except three allowed for changes in assumption regarding exchange rates.

4.6 Implied target prices and stock performance

For the interest of the reader, the target price that is derived in the models is presented in Table 7. It should be noticed that the valuation date was all within in the same week except for model 4. The stock price of H&M during the period the valuations were performed is presented in Graph 1. It is notable that even though the assumptions that are made in each model vary to a large extent the corresponding target price is rather similar.

Firm	Target price	Valuation date
Firm 1	410 SEK	2008-04-14
Firm 2	447,4 SEK	2008-04-17
Firm 3	474 SEK	2008-04-18
Firm 4	391 SEK	2008-03-05
Firm 5	584 SEK	2008-04-18
Firm 6	356 SEK	2008-04-17
Firm 7	547,5 SEK	2008-04-18
Firm 8	512 SEK	2008-04-15

Table 7: Target prices for H&M by the different investment banks

The fair value derived from the models ranged from 356 SEK to 584 SEK, averaging around 464. However, the reader should note that the derived fair values of H&M are in all cases (except for model 6) higher than what the stock were trading at during the valuation date.
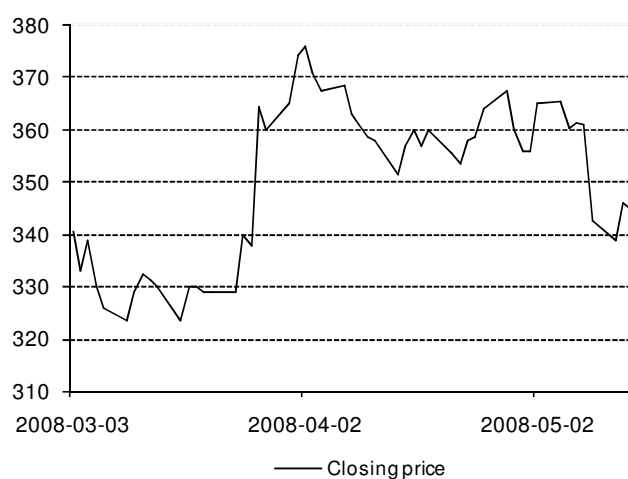
Graph 1: H&M share price 3 March – 14 May 2008[30]

[30] www.e24.se.

5. Discussion of empirical results

This section will compare the theoretical recommendations, presented in section 3, with the empirical findings, presented in section 4. Given the purpose of this paper each aspect of the theoretical recommendations will be compared to its corresponding empirical findings in order to accentuate potential differences.

5.1 Historical information

The basis of the DCF model is to collect and analyze relevant historical accounting information in order to evaluate historical performance. A solid understanding of the past performance will enable reasonable forecasts of future performance. Thus, **the number of years, the quantity and quality of historical information** included and to what extent the **historical information is being analyzed** are three essential key components that can be used to determine the quality of historical information used in any DCF model.

Number of years of historical information: More years in a model inevitably require more information input, but a longer time frame also provides a more extensive understanding of past performance and potential business trends. Therefore, through including a sufficient number of historical years the predictability of future performance should increase.

The empirical finding on the number of historical years that was presented in the models was therefore surprising. One would expect that as many years as possible would be included in all of the studied models. However, the number of years included in the models varied between two and eleven years and one model did not include any historical information at all. The significant variations clearly show that there are great differences and no general practice among Analysts regarding the theoretical recommendation on this feature.

Furthermore, it is questionable how an Analyst that includes five years or less of historical information can get an understanding of historical performance and potential business trends. It also questions the importance that the Analysts place on historical performance when predicting the future.

The quantity and quality of historical information: According to Jennergren (2007a), a DCF model must at a minimum include entire historical income statements and balance sheets. However, additional information in the notes of the financial statements may provide supplementary information regarding past performance that might improve the accuracy of predicted future performance. Therefore the empirical findings of the quantity and quality of historical information were unexpected.

Only five of the models included entire income statements and balance sheets, which corresponds to the minimum theoretical requirement. One of these models exceeded the theoretical bare minimum by including notes and other supplementary historical information in addition to the historical income statements and balance sheets. In addition, three models were found insufficient regarding this feature.

It is uncertain how an Analyst that does not include any historical information at all, or only include fragmented parts of the income statements and balance sheets, are able to claim a solid enough understanding of past performance to provide extensive and credible forecasts.

Analysis of historical information: Even though a model might have included a sufficient number of historical years and a sufficient quantity and quality of historical information the information must be analysed properly to add value to the analysis. By calculating financial ratios the historical performance becomes evident and can therefore be used to create assumptions that generate credible expected future forecasts.

The empirical findings showed however that only three models did extensively calculate financial ratios. The remaining five models might have included a sufficient historical period- and sufficient quantity and quality of historical information but have failed to calculate financial ratios extensively. The reason for including historical information without analysing it raise concerns regarding the quality of the models.

The understanding of historical performance can be concluded as limited in the majority of the studied models. It is also possible that the analysis of historical performance is not included in the models. Whatever the case, it is impossible for an external user of these models to gain a quick understanding of historical performance and what reasonable assumptions that can be made regarding the future performance without a thorough historical analysis.

5.2 Forecasting procedure

The forecasting of expected future performance should be generated by **assumptions clearly linked to the analysis of the historical performance**. These assumptions should be clearly stated in a **separate section** and should be able to **generate future expected income statements and balance sheets** from which the free cash flow can be derived. Furthermore, the **number of years in the explicit forecast period** should be at a minimum of 10-15 years. These features are essential to determine the quality of the forecasting procedure in any DCF model.

Number of years in the explicit forecasting period: The explicit forecast period should not be shorter than the average life time of the PPE of the valuation target. Therefore, if all

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models would have applied theoretical consensus when constructing the models the number of years in the explicit forecast periods would all be the same. Furthermore, the explicit forecast period determines how many years the Analyst assumes it will take until the entity that is being valued will reach a steady state growth.

Thus if an Analyst assumes an explicit forecast period of three years it implies an assumption of an average life time of PPE of three years or less. Given the case of H&M it is clearly incorrect to make this assumption since the average life time of PPE of H&M has been calculated to ten years. With a theoretical standpoint one can argue that any model using an explicit forecast period for H&M of less than ten years has a too short explicit forecast period.

The empirical findings were therefore rather surprising. The variation of the number of years in the explicit forecast period was great, which indicates that there is no consensus in practice regarding this feature. Furthermore, the explicit forecast periods in five out of eight models were less than the theoretical minimum requirement of ten years. It is uncertain how these models argue that H&M will enter true steady state in less than ten years.

The quantity and quality of the forecasted information: According to theoretical recommendation, the quantity and quality of the forecasted information should at a minimum include entire income statements and balance sheets from which the free cash flow can be derived. Through forecasting entire income statements and balance sheets it is possible for individuals without extensive knowledge in financial modeling to calculate financial ratios to assess the assumptions on future performance that has been made. Furthermore, it is a requirement in order to assess the matching of the expected free cash flows with the expected financial cash flows.

However, the empirical findings showed that only three of the eight models forecasted entire income statements and balance sheets and used these to derive the expected free cash flows. The remaining models forecasted simplified income statement and balance sheet items. Thus, it is evident that theory is not taken into consideration in practice to a large extent regarding the forecasting procedure of including entire income statements and balance sheets.

Separate assumption section: Through clearly stating all assumptions in a separate section the reasonability behind the assumptions becomes evident and mistakes regarding the content of these cells in the model are avoided. The empirical study shows that four models included a separate assumption section while the remaining four stated assumptions in various sections in the models.

Without a separate assumption section it is unclear what the assumptions are based on. Furthermore, these models inhibits changes in assumptions since often more than one cell in the model will have to be changed which also increases the probability of inaccuracies in the model. Evidently this does not concern half of the Analysts that have constructed these models.

Assumptions clearly connected to the analysis of the historical performance: Even though a model includes a satisfactory number of years in the explicit forecast period, and they do forecast entire income statements and balance sheets, the models should account for how assumptions on future expected performance are connected to the analysis of historical performance. According to theory, historical information should be analysed with financial ratios; these ratios should then be used to derive the assumptions that are used to forecast the future performance.

As already concluded not all models did analyse historical performance using financial ratios in an adequate manner, thus only the models that did so can use their analyses to forecast future performance. The empirical findings were rather disappointing regarding this feature since merely two models displayed any direct connection from analysis of historical performance to the assumptions regarding future performance. It is therefore uncertain how the remaining six models derived their assumptions.

5.3 Discount rate

The theoretical recommendations on how to determine the correct discount rate are briefly summarized in section four as are the empirical findings in section five. Given the extensiveness of the theoretical recommendations, and the numerous components that are included in the discount rate, this section will not be as exhaustive as the previous sections. However, the discount rate is of great importance in any DCF model and therefore calls for an analysis.

Discount rate: Since the free cash flow is attributed to all investors in the firm, the discount rate of the entire firm must correspond to the weighted average of required rate of return of all investors, i.e. the WACC. Given the WACC formula, if the target capital structure is assumed to be 100,0 percent equity the WACC equals the required rate of return on equity. The empirical findings showed that all models except one presented the WACC as the discount factor.

However, only Model 2 and 5 displayed minimum calculations regarding how the discount rate was derived. The value of the discount rate varied from 6,4 percent to 9,0 percent, and without any calculations these values seems arbitrarily chosen. Given the great impact the discount factor have on the value it is surprising that none of the models motivate the

assumptions behind the WACC. It also questions whether it is the changing of the discount factor that is used to derive the new recommendations or a thorough analysis of new market information.

5.4 Steady state assumption

The second period of the forecasting of a firm's financial performance is the post-horizon period. When the firm has reached steady state the terminal value is calculated by a continuing value formula. Regarding the steady state assumptions, the model must be constructed in a manner so that **true steady state can be determined,** the **target must be in true steady state** for a continuing value formula to be applied and the **terminal growth rate** must be less than or equal to that of the economy.

The possibility of establishing true steady state: If the model is constructed in a theoretical correct manner it should be possible to easily extract an additional year after the first year in steady state. By doing this extraction, it is possible to determine whether the expected free cash flow that is used in the continuing value formula is in true steady state.

However, only four models were constructed in such a way for this quality check to be made. The remaining four models could therefore not be determined whether these were truly in steady state when the continuing value formula was applied.

Target must be in true steady state: Given the significance the terminal value has on the total value it is crucial that the target is in true steady state when the continuing value formula is applied. If the model is not in true steady state the free cash flow that is used in the perpetuity formula is incorrect and the inaccuracy of the model will be great.

Only four models allowed for verification of true steady state and three of these proved to be accurate on this feature. However, one model could be proven inaccurate on this condition. The error was due to the fact that the capital expenditure growth did not correspond to the terminal growth rate. Even though the capital expenditures in H&M are not as large as in an industrial company they are still significant and the inaccuracy in value is therefore potentially great in this model.

Terminal growth rate: The terminal growth rate in steady state must be less than or equal to that of the economy. Since the economic growth is expressed in nominal terms the models need to take into consideration both real growth and inflation. The terminal growth rate have great effect on the terminal value and thus it is essential that it is expressed clearly what is assumed.

The empirical study showed that the terminal growth rate ranged from 2,5 percent to 3,5 percent whereas one model assumed zero real growth. It should also be noted that all models hard coded this assumption and made no explanation on why a certain value was chosen. It is also interesting to note that there is no consensus regarding the growth of the economy among Analysts.

5.5 Other valuation aspects

The previous sections have covered the discrepancies between theoretical requirements and the empirical findings concerning the basic requirements of the DCF model. However, the matching of the **financial cash flow** with the free cash flow, the possibility to allow for changes regarding assumptions on **inflation**, the **implied interest rate on excess marketable securities** and the possibility to allow for changes regarding assumptions on **future exchange rates** all add value to any DCF model and could potentially be crucial for the accuracy of the value derived.

Financial cash flow: With proper calculations and through correctly defining the balance sheet the free cash flows should match the financial cash flows. Therefore the matching of the free cash flow with the financial cash flow verifies the balance of the model. However, only one out of eight models did include any calculations of the financial cash flows and assured they matched.

The free cash flow calculations can be correct without this verification but as an external user it is difficult to determine. It can be concluded from the empirical findings that the concept of financial cash flow is not used to a large extent in practice and therefore it is questionable whether the models do balance and if the free cash flow calculations are correct.

Inflation: Inflation could have potential great effect on the value of a firm and therefore any DCF model should include assumptions regarding inflation and should allow for this assumption to be variable. The techniques on how to derive assumptions on inflation was discussed in section 3. These derivations might be hard to include in a DCF model and are perhaps not within the scope of what should be included in a DCF model. However, it is remarkable that none of the models included any assumptions regarding the actual value of the expected inflation. It clearly is not in the interest of the Analyst to include any assumptions regarding inflation and the impact of future inflation seems to be disregarded.

Implied interest rate on excess marketable securities: The implied interest rate on excess marketable securities is merely a quality control regarding the assumptions that are made on future interest income and the future value of excess marketable securities. It is evident that

the interest rate on these securities cannot be higher than the return that is earned from the operations. If so, it would be more profitable to discontinue the operations and receive a higher return from the interest from the excess marketable securities.

Given the five models that forecasted entire income statements and balance sheets, and could therefore be analyzed on this aspect, four had reasonable assumptions regarding the implied interest rate on excess marketable securities. However, one model assumed a rate of more than 10,0 percent in perpetuity which is an incorrect assumption following the argument above. Although only one model failed this aspect it accentuates that errors do exist in practice and that the implied assumptions should be analysed in any model to determine its quality.

Currency forecasts: Given that the valuation target generates cash flows in different currencies the model should include assumptions on future expected exchange rates that are variable which enables the value to be converted into one currency. According to theory, this should be done either using the spot rate method or the forward rate method. The empirical findings showed no indications of any special method that was used on this aspect.

However, there were five models that divided the sales forecasts into different regions and therefore used changeable exchange rate assumptions to receive the value in one currency. The remaining three models did not include extensive sales forecasts divided by regions and did therefore not require any assumptions on future exchange rates to be included. It is remarkable that not all models had extensive enough sales forecasts that did required exchange rate assumptions to be included, especially since the value of H&M is so clearly driven by sales.

5.6 Summary

Table 8 concludes the empirical discussion concerning each aspect and model. It is evident that the differences between the theoretical recommendations and the empirical findings are great. Furthermore, this table should be viewed as a quality check of the models included in the study and it is obvious that the overall result was significantly poor.

Firm	Historical information			Forecasting procedure				Discount rate					Steady state assumptions			Other valuation aspects				Fulfilled crit.
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	Total
Firm 1	✗	✗	✗	✗	✗	✗	✗	✓	N/A	N/A	N/A	N/A	✗	N/A	✓	✗	✗	✓	✗	3
Firm 2	✗	✓	✓	✗	✓	✗	✓	✓	N/A	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓	13
Firm 3	✓	✓	✓	✓	✓	✗	✓	✓	N/A	N/A	✓	✓	✓	✗	✓	✗	✗	✗	✓	12
Firm 4	✗	✓	✓	✗	✓	✗	✓	✓	N/A	N/A	N/A	N/A	✗	N/A	✓	✗	✗	✓	✓	8
Firm 5	N/A	N/A	N/A	✓	✗	✗	✗	✓	N/A	✓	✓	✓	✓	✓	✗	✗	✗	N/A	✗	7
Firm 6	✓	✗	✓	✗	✓	✓	✗	✓	N/A	✓	✓	✓	✓	✓	✓	✗	✗	N/A	✓	12
Firm 7	✓	✓	✗	✗	✗	✗	✗	✓	N/A	N/A	✓	✓	✗	N/A	✓	✗	✗	✓	✗	7
Firm 8	✓	✓	✓	✗	✓	✓	✓	✓	N/A	N/A	✓	N/A	✗	N/A	✓	✓	✗	✓	✓	12

Table 8: Concluding empirical findings[31]

Assuming that all criteria's have the same quality weighting the models can reach a maximum quality score of 19. The quality scores vary between 3 and 13 with an average score below 50,0 percent.

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[31] The following abbreviations are used in Table 7: fulfilled the theoretical recommendation (✓), not fulfilled the theoretical recommendation (✗), not available (N/A).

Historical information

Criteria 1: The number of years of historical information included should be sufficient to determine historical performance and possible business trends (minimal requirements 5 years).

Criteria 2: The extensiveness of historical information should at a minimum include entire income statements and balance sheets.

Criteria 3: The historical information should be analyzed through calculating financial ratios.

Forecasting

Criteria 4: The number of years in the explicit forecast period should be at least 10-15 years.

Criteria 5: The forecasting should include entire income statements and balance sheets.

Criteria 6: The assumptions on future expected performance should be clearly linked from an analysis of historical financial ratios.

Criteria 7: The assumptions should be clearly stated in a separate section.

Discount rate

Criteria 8: The WACC should be used as the discount factor for free cash flows.

Criteria 9: The cost of net debt should be calculated using the company's yield to maturity.

Criteria 10: The marginal tax rate should be used as the tax rate in the WACC formula.

Criteria 11: The target capital structure is approximated by the company's current debt-to-value ratio.

Criteria 12: The required return on equity should be calculated by using the CAPM formula.

Steady state

Criteria 13: The model must be constructed in a manner so that true steady state can be determined.

Criteria 14: The company must be in true steady state for a continuing value formula to be applied, i.e. the free cash flows in steady state must grow at a constant rate consistent with the assumed terminal growth rate.

Criteria 15: The terminal growth rate in steady state must be less than or equal to that of the economy.

Other valuation aspects

Criteria 16: Financial cash flows must be calculated and should be identical to the free cash flow.

Criteria 17: The inflation should be an assumption input that is possible to be changed.

Criteria 18: In perpetuity the implied interest rate on excess marketable securities should not be any higher than the return from the operations.

Criteria 19: Cash flows in local currency should be denominated to one currency using changeable assumptions regarding future exchange rates.

6. Why the discrepancies?

The discrepancies between theoretical recommendations and the empirical findings regarding each chosen aspect are evident in Table 8. It can therefore be concluded that the majority of the models do not achieve the minimum theoretical quality recommendations. However interesting it might be to draw this conclusion the inevitable question becomes:

Why are there such significant differences between the theoretical guidelines and the practical use of the DCF model?

This section will with the best of the authors' knowledge try to provide credible explanations to this question.

Explanation 1

The models that are included in this study are all used in equity research purposes and therefore they are intended to be used in an on-going basis. Thereby, the Analyst must be able to quickly include new information that might arise in the market through changing critical assumptions and thereafter derive a new recommendation.

Since it is evident that these models generally only include a bare minimum of historical information, new information (other than the release of new financial statements) that arises in the market must be incorporated in some way. Furthermore, since the assumptions in these models are often hard coded and without linkage to historical information the Analyst can easily change any assumption he sees fit in order to change the fair value of the stock. Thus, if for instance new positive information arrives in the market this should be included in the model and have a positive effect on the fair value. The theoretical correct way to account for this information would be to include the new information, analyse it, and then finally derive new forecasts based on the new analysed information. Given the fact that many of the models are not extensive enough, this theoretical approach would sometimes not be possible while in plausible cases it would be tedious. Hence, it is possible that the Analyst simply changes the assumptions regarding future performance rather than using the theoretical approach.

One possible explanation would therefore be that the on-going usage of these models does not promote assumptions to be supported by extensive analysis since they are required to be changed each time new information arrives. Furthermore, given the fact that the models are modified continuously some models are likely to include errors and appears poorly constructed.

Explanation 2

Since it is the job of the equity research analyst to predict the changes in the value of the stock he will use as many tools as he sees fit in order to improve the accuracy of his predictions. Therefore the DCF model is simply one of many tools that can be used by the Analyst in order to arrive at a conclusion regarding the value of the stock. Thus, if it is the opinion of the Analyst that the fair value of the stock is of a certain value he needs to support his opinion with all the valuation methods that he disposes. Therefore, the Analyst must make sure that the DCF model arrives at a fair value corresponding to all other valuation methods.

If the assumptions in the model would have been derived from a clear linkage of analyzed historical information it would be rather difficult to motivate unreasonable changes in these assumptions. Therefore, it is in the interest of the Analyst to construct a model that allows for changes in assumptions without losing the credibility of the model. Through not including a rigorous historical analysis the changes in assumptions do not have a logical benchmark and can therefore be made more arbitrarily.

Provided that the Analyst uses various valuation techniques the derived values must correspond for the recommendation to be credible to investors. Thus, it is possible that the Analyst sometimes use the DCF model as a tool to support his predetermined decision of the fair value. Thereby, in many cases the DCF model appears to act as a cosmetic argument to support the derived recommendation. This would explain the empirical findings regarding inconsistencies, theoretical absence, errors and the non- user friendliness of the models.

Explanation 3

One should notice that all models except one derived a fair value higher than the market value at the time of valuation. Thus even though the models varied to a large extent, with regards to the assumptions that was made, they all reached a similar recommendation. Thus there seems to be a clear market consensus regarding the fair value of the stock. The reason for this may be that the market does not realize the full potential of H&M according to the Analysts. A more reasonable explanation may be that the Analysts prefer to make recommendations that correspond to consensus and collectively be incorrect rather than potentially being correct individually.

If it is truly the case that the Analyst is afraid of being unique then it is also in his interest to construct a model that derives a fair value similar to the market consensus. If the assumptions that derive the value of the market consensus cannot be explained through the theoretical

analysis of historical performance the assumptions in the model will appear arbitrarily chosen. Hence, this can also explain the difficulty to analyse the models, why they include hard coded assumptions and why they lack an overall connection to theory.

Explanation 4

In any investment bank there are numerous guidelines and requirements, this also apply for how the DCF model should be constructed. Therefore, the Analysts have been affected by the practical guidelines on how to construct a DCF model. It is unlikely that an entry-level analyst disregard the practical guidelines in preference for a more theoretical approach since he is likely to treasury his future employment.

If the investment bank does not have a strong connection to theory when constructing guidelines, there will be obvious differences between practice and the theory regarding the construction of the DCF models. Given the hierarchical structure of the investment banks it is likely that the practical recommendations will remain unchanged unless the issue is raised on a senior level.

7. Conclusion

The purpose of this thesis was to compare the practical use of the DCF model with the theoretical perspective. The difference between the theoretical recommendations and the empirical findings regarding the selected aspects in this study were found significant. If the theoretical recommendations are used as determinants of quality then it is also concluded that the vast majority of the models were of poor quality. Additionally, there were significant errors in some of the models. It is also likely that errors exist in these models regarding other aspects that were not included in this study.

The empirical study included approximately 50,0 percent of the DCF models that are used in practice to determine the fair value of H&M. Furthermore, the investment banks that provided us with these models are dominant in the market. Therefore, the practical importance of these models in order to determine the aggregated recommendation regarding the H&M stock is significantly great. Given the poor quality of these models this could imply that the overall recommendations regarding the H&M stock are theoretical incorrect and thus the H&M stock is trading at an incorrect value. This conclusion is probable according to the authors. However chocking this conclusion might be, the value of the stock is a function of supply and demand in the market and not a theoretical correct value. If thereby the majority of the market assumes a theoretical incorrect value it will become the prevalent stock market value.

There were four explanations provided in section 6 intending to answer why there are discrepancies between theoretical recommendations and empirical findings. It is the opinion of the authors that all these explanations are plausible and may to some extent answer the question. However, given the effort that was put into many of these models, the existence of obvious errors, how they still fail to fulfil the basic quality aspects and how user-unfriendly they are inevitably makes us questions the intention of these models. It is therefore the opinion of the authors that these models are to a large extent a cosmetic tool presented to investors to motivate a recommendation. It is therefore in the interest of the investors and the contribution of this paper to understand the aspects that determine the quality of DCF model.

7.1 Self-criticism

The decisions and limitations that have followed the process of writing this thesis are presented as follows.

It could perhaps be argued that the empirical data included in this study is not extensive enough. Obviously we would have preferred to have included all existing empirical data but

given the secrecy of investment banks this was not possible. However, we did collect approximately 50 percent of all available data and were able to receive models from the most prominent investment banks in the market.

We believe that we did choose the most important theoretical aspects to be studied in this thesis. However, additional aspects could have been included or existing aspects could have been discarded. Given the limitations of this thesis only a few aspects could however be included.

Given that we wanted to compare different DCF models that all value the same target with theory we were limited to DCF models used in equity research purposes. It is probable that DCF models used in merger and acquisition (M&A) cases might be more extensive and theoretical correct. However, it is unlikely that more than eight different DCF models are constructed in an M&A situation and that we would be allowed to receive these models. Therefore, we limited the data to equity research DCF models.

Based on the decisions above we believe that the data, delimitations and the methodology has been the most appropriate in order to investigate the practical use of the DCF model in firm valuation.

7.2 Implications for future research

This thesis was limited to the case of H&M. If the study would be replicated on additional companies it would be possible to compare the empirical findings between the studies. A larger study could therefore either discard the conclusions that were made in this thesis or validate them and make them more general. If the conclusions are made general investors would probably start question and analyze the advice they receive to a larger extent. The corresponding equity research departments will therefore have to improve their DCF models and thereby the quality of their advice in order to remain credible.

Furthermore, this study could be replicated but with the inclusion of a DCF model that has been correctly constructed according to theoretical recommendations. This would enable to compare the derived target prices of the empirical models with the theoretical correct value and compare assumptions to a larger degree. However, this model must be flawless in order for the person that constructed the model to claim that a correct theoretical value has been derived. Additionally, this would imply that the person assumes to have superior knowledge compared to the Analysts in all assumptions that are made.

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