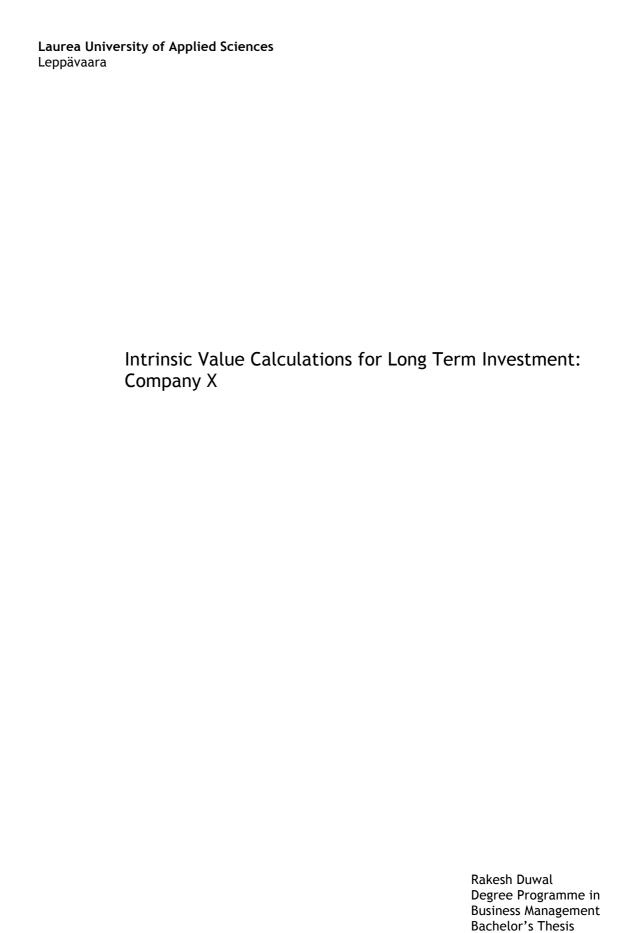# Intrinsic Value Calculations for Long Term Investment: Company X

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Intrinsic Value Calculations for Long Term Investment:
Company X

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The goal of the study is to find the intrinsic value of listed public Finnish companies. The thesis will use two approaches. The first approach was established by Benjamin Graham and is used to calculate intrinsic value and provide some statistical guidelines for investing in a company. The second approach is the discounted cash flow method and specifically the method established by Aswath Damodaran will be used to calculate the intrinsic value. The method founded by Benjamin Graham is called the undervalued intrinsic value calculation method. Company X (institutional investor) is used as a case company. It is an organization that collect funds from its members and invest those funds in securities, financial instruments and different asset classes. Company X could use these analysis, statistical guidelines and formulas to buy a minority stake in different public companies.

In the stock market there are many companies whose market value differs from the intrinsic value. Finding and investing in those companies must be done only after careful analysis and by taking minimum risks. This thesis will analyze many companies from different perspectives to find the undervalued companies and find their intrinsic value. Different formulas will be used, and the intrinsic value is found for a certain date in the past (30 April 2002). The intrinsic value calculated through these two method is compared and analyzed. The intrinsic value calculated through the two methods is supported by the presentation of earnings and dividends recorded at a later date (2002-2015). Similarly, the market price trend of the company's share is also presented to support the intrinsic value calculated through these methods. These methods of calculating intrinsic value are considered beneficial and any investors should perform careful calculations when calculating intrinsic value and should be conservative when buying any share of a company by having enough margin of safety.

Different formulas are used to determine whether the company is a good target for investment. Earning and dividend record from 2002 to 2015 shows that these calculations and analysis generate financial gain to investors. These analysis are beneficial and have a good scope in Finnish stock market.

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1   Introduction

Different companies and institutional investors want to own a minority interest or stocks in different public companies. Most of the investment decisions are quite good which returns a good profit in the future. But investing in blue chip companies could also yield good profit in the long run. For a investor (refers to company X or institutional investor) to yield an outstanding profit, they needs to invest in a carefully analyzed company, at a reasonable price. Investors can earn better return by performing different analysis of the company. This analysis includes the analysis of company's financial position, historical record and its future growth prospects. This analysis helps the investors to achieve better financial results than the stock market in the long run. Investments based on analysis and intrinsic value of the company can earn better profit from dividends and appreciation of market value in the future.

In this thesis, analysis is performed at a reference date of 30th April 2002. Analysis of stock is performed with the help of datas and information available upto 30th April 2002. And to see whether analysis and intrinsic value calculation method could be beneficial, this thesis will compare the intrinsic value calculated through two method, examine the financial result (earning and dividend record) of a company from 2002 to 2015 and also look at the adjusted market price of the particular stock from 2002 to 2016. So, the financial gains that could be realized by the investors by investing in those analysed companies are also presented.

In this report, first the theories related to undervalued intrinsic value calculation method and discounted cash flow method are presented and then, practical guidelines such as tables, formulas, and statistical guidelines are presented. Next, datas are presented and calculated through undervalued stock analysis, intrinsic value calculation process and determining margin of safety. Similarly, these analysis and calculation are further examined by comparison of intrinsic value calculated through each method and presenting th financial result of selected companies to support the analysis.

1.1   Purpose of the thesis

The purpose of the thesis is to compare the analysis and formulas defined in this paper. The thesis aims to evaluate different companies based on fundamental value analysis and calculate an intrinsic value of different selected company's stock. Company X could use these formulas to invest in the stocks of public companies. Investment performed on the basis of these formulas is expected to gain substantial profit in the form of capital gain or dividend in the long run.

The analysis will aim to find the undervalued companies in the stock market. Then, those companies which meets the requirements as an undervalued company is selected for further calculation . And then intrinsic value of selected companies are calculated.

1.2   Task list

The main objective of this thesis is to calculate and compare the intrinsic value of public Finnish companies. Below is the list of tasks which will help in achieving the main objective.

• The inputs and method to be used to find the undervalued stocks will be defined first.

• Thereafter intrinsic value calculation method, which can be used to measure the value of a share and the whole company, will be defined and modified according to investment approach of various professionals. Mainly, the literature related to Benjamin Graham's investment approaches and Aswath Damodaran's discounted cash flow method is described.

• To test the undervaluation criteria, information of many public Finnish companies will be gathered. Then, those companies which pass those undervaluation criteria will be selected and their intrinsic value will be calculated.

• The intrinsic value of stock will also be calculated through undervalued intrinsic value calculation method and discounted cash flow method to allow comparison and evaluate the result.

• Finally, result of two analysis method will be compared, financial result of the company will be examined from 2002 to 2015, adjusted market price of the particular company will be examined from the year 2002 to 2016.

1.3   Research Method

There are many sources from where required information can be gathered. Some example of those sources include books, annual reports, websites and electronic materials. Investment principles are largely based on books. Information about the company will be collected mainly from annual reports. Those data will be arranged in the excel table to find undervalued stock and calculate intrinsic value. Information about the market price of the stock will be collected from webpage of Nasdaq. Research carried out for this thesis work will be based mainly on electronic sources like online articles, research papers, company's webpages and electronically published reports and guides.

2   Investment Principles

Investment is an act of commiting money or capital in order to achieve higher income or profit in the future. There are different types of investment such as short term investment, ordi-

nary shares, fixed-income securities, managed funds, derivatives and some miscellaneous investment. Short term investment includes money market managed funds, deposit accounts, commercial papers and so on. Ordinary share investment means common stock investment in a publicly listed companies. Fixed-income securities includes bonds, convestible securities, and preference shares. Managed funds includes actively managed funds(mutual funds) and passively managed funds(index funds). Derivatives includes options and futures. There are few other investments types such as real estate and other tangible assets. Among different types of investments, this thesis is only concerned about common stock investment.

There are many definitions of investments presented by different value investment professionals. According to Graham & Dodd (2009, 106), "An investment operation is one which, upon thorough analysis, promises safety of principal and a satisfactory return. Operations not meeting these requirements are speculative."

"An Investment is simply any asset into which funds can be placed with the expectation that it will generate positive income and/or preserve or increase its value." (Gitman, Joehnk, Smart, Juchau, Ross & Wright 2011, 3)

According to Damodaran (2002, 26) " A good investment is one that makes a return greater than the cost of funding it. To evaluate whether the investments that a firm has already made are good investments, we need to estimate what returns these investments are producing, how much uncertainty there is in existing investments and the implications for a firm."

Most of the investment professionals define investment as an act through which more value is created in the future by investing funds or capital at present.

3   Undervalued intrinsic value

Common stock investment principle of Graham and Dodd serves as the main base for undervalued intrinsic value calculation. Graham and Dodd lays down many techniques for analysis of value and selection of stocks based upon definite standards of safety of principal. While Graham and Dodd serves as the main base for our research, we will refer to many other value investment principles to make different points in this thesis clearer.

3.1   General investment terms

There are many investment terms and general ideas that could be described first to understand the main idea of this thesis.

3.1.1   Institutional investor

Institutional investor are the types of investors who earn their living by managing other people's funds. Institutional investors includes banks, insurance companies, managed funds and other fund management companies. Institutional investors are the knowledgeable persons and institution, who trades securities in huge quantities and thus have preferential treatment and lower commissions.

3.1.2   Undervalued and overvalued stocks

In the stock market, market price of stock frequently reach out of line with the true value (intrinsic value). Sometime, the market price reach too high than the true value and sometime it reach too low than company's true value. Stock price can be termed as undervalued if the market price of the stock is below the intrinsic value and overvalued if the market price of the stock is higher than the intrinsic value. These value cannot be justified with the fundamental of the company. Sometime, overvaluation and undervaluation are the result of fear and greed. And sometime, the negligence and overestimation of the company result in undervaluation and overvaluation of a company.

3.1.3   Margin of Safety

Investors could achieve a margin of safety by buying shares in businesses at a large discount to their underlying value, and they needed a margin of safety because of all the things that could- and often did-go wrong. Margin of safety helps investors to answer how safe is the business? Margin of safety is described more in section 3.4.

3.1.4   Risk and reward

If you buy a dollar bill for 60 cents, its riskier than if you buy a dollar bill for 40 cents, but the expectation of reward is greater in the latter case. The greater the potential for reward in the value portfolio, the less risk there is (Buffett 1984, 14). The risk and reward concept in the undervalued intrinsic value method is related to the margin of safety and intrinsic value of the particular stock. Buying a stock is riskier at the price above or near to the intrinsic value and buying a share below to the intrinsic value is considered less riskier and more reward is to be expected.

3.1.5   Enterprising Investor

Enterprising investors are those investors who "have a clear concept of the differences be-tween market price and underlysig value …[and] should firmly base his stock selection on the margin-of –safety principle" (Graham 2005, xiii). The investment technique is described more in seciton 3.2.

3.2 Analysis of stocks

There are different types of analysis to be performed to find whether the stocks are under-valued in market in comparison to their fundamental values. This thesis will analyse and se-lect the stocks as per the stock selection criteria of enterprising investors. At first, six criteria that are suggested for enterprising investors are described. And to find relatively broad range of stocks, certain criteria that is prescribed for defensive investor will also be used for the analysis as a substitute for two analysis criteria used for enterprising investor. As enterprising investors are the one who can take adventure beyond the safe and sound territory that is rec-ommended for defensive investors, it could be understood that the analysis criteria suggested for defensive investors could also be used by enterprising investors (Graham 2005, xiii). Such analysis includes examination of particular company in term of their liquidity, profitability, solvency and some other aspects. To examine whether a company is good enough from all these aspects, analysis on the basis of following criteria are performed.

3.2.1 PE ratio

Price to Earning (PE) ratio shows how much any stock is priced relative to the earning of the company. PE ratio is one of many valuation criteria. High PE ratio means that the stock is val-ued higher in relation to the earning of the company. Low stock price in relation to recent earning is a simple prima facie indication that a stock is cheap. Stocks that are selling at PE multiple of nine or less would make a goodly number of candidates for further selectivity (Graham 1973, 385).

3.2.2 Financial condition

Financial condition or more specifically, net working capital is good measure of the short-term liquidity of the company. Companies with good financial condition are able to utilize their assets in an efficient manner. According to Graham (1973, 385), some additional criteria for stock selection is the financial condition of the business. "Current assets should be at least 1.5 times current liabilities and additionally for industrial companies, debt should not be more than 110% of net current assets" is a criteria to examine the financial condition of a business.

3.2.3 Earning stability

Companies which have a stable earning are considered less riskier than those which have a volatile earning. Earning stability is a key criteria to invest in any company. Graham (1973, 386) suggest that that there should be no deficit in the last five years.

3.2.4 Dividend record

Companies that pay dividend to the investors means that the company is able to generate profit from the business and also able to reward their investors. Graham(1973, 386) suggest that the stocks should have some current dividend.

3.2.5 Earning growth

Companies, whose earning are growing in the recent years means that it is gaining market share either in the new market or from the current market through competitive advantage. According to Graham (1973, 386) last year's earnings should be more than that of 3 year earlier.

3.2.6 Price to net tangible assets

Price to net tangible assets is a valuation ratio which represents the price of a security as compared to the book value(net tangible assets) of the company. This ratio represents the value that an investor would get if the company were to stop its operation and liquidate all its tangible asset. According to Graham (1973, 386) market price should be less than 120% net tangible assets.

3.2.7 Alternate criteria

As Graham (1973, 349) suggested, for defensive investor, "current price should not be more than 15 times average earning of past three years and current price should not be more than 1.5 times the book value last reported." "However, a multiplier of earning below 15 could justify a correspondingly higher multiplier of assets. As a rule of thumb we suggest that the product of the multiplier times the ratio of price to book value should not exceed 22.5."

So, this criteria suggested for defensive investor could be used as a substitute for PE ratio and price to net tangible assets both. This will help to find a broad range of stocks and not miss the opportunity to select some good stocks.

3.3   Intrinsic value

Intrinsic value is, as defined by Graham and Dodd(2009, 64), "that value which is justified by the facts, e.g., the assets, earnings, dividends, definite prospects, as distinct, let us say , from market quotations established by artificial manipulation or distorted by psychological excesses."

"Our study of the various methods has led us to suggst a foreshortened and quite simple formula for the valuation of growth stocks, which is intended to produce figures fairly close to those resulting from the more refined mathematical calculations." "Our formula is:
Value =Current (Normal) Earnings x (8.5 plus twice the expected annual growth rate)"
"The growth figures should be that expected over the next seven to ten years."(Graham 1973, 295)

The table below shows calculating the value stated above works out for various rates of assumed growth.

Expected growth rate	0,0%	2,5%	5,0%	7,2%	10,0%	14,3%	20,0%
Growth in 10 years	0,0%	28,0%	63,0%	100,0%	159,0%	280,0%	390,0%
Multiplier of current earnings	8,5	13,5	18,5	22,9	28,5	37,1	48,5

Table 1: Annual Earning multipliers based on expected growth rates (Graham 1973, 296)

"Typically, the midpoint of the value has been found by applying an appropriate multiplier to estimated future earnings. My present view is that this is not the best technique. Instead, the earnings figure taken should be what we call "normal current earnings", and all the future prospects-favorable ot unfavorable, specific or general- should enter into the multiplier"(Graham 1975, 2).

Referring to the value formula stated above, Graham (1975, 2) writes "this valuation formula-like those it porported to approximate-had the great defect of failing to allow for changes in the basic rate of interest. But the one development in the past decade that has had the greatest influence in stock values-and, somewhat belatedly, on stock prices- had been the phenomenal advance in interest rates. For the three years preceding the publication of our text the yield on AAA bonds averaged 4.4 percent, and that was also the figure just ten years ago."
"It would seem logical to me to make common-stock valuations vary inversely with representative current interest rates corresponding to the analyst's use of representative current earnings. Suppose we restated our 1972 formula with that objective, making it reflect the then going AAA rate of 4.4 percent. The expression would then read:
Value = Earning times the sum of 37.5 plus 8.8 G., divided by the AAA rate." (Graham 1975, 3)

This value formula add two more criteria in valuing the growth stocks in addition to the criteria formulated before (earning and appropriate growth multiplier). First is the required rate of return. This required rate of return is the normal risk-free rate of return. 4.4 percent would be the required rate of return from an investment. Another criteria would adjust this required rate of return to the present. AAA bond rate is used to adjust required rate to the present.

So, the corrected formula could be restated as follows to make it look similar to the value formula Graham (1973, 295) established earlier:
Value = Earning x (8.5 plus twice the expected growth rate) x 4.4/AAA bond rate

Everything in this formula looks calculable, but expected growth rate is a quite subjective term to every investor. Can expected growth rate be as objective term as other variables in this formula? In quest for the answer to this question different writings of investment professionals can be referred. According to Buffet (Berkshire Hathaway Inc. Shareholder Letters, 1995), Berkshire's book value serve as a rough, albeit significantly understated , tracking measure for the company's intrinsic value. In 1994 two measures moved in concert: Book value and intrinsic value gain were approximately same for the company. Buffet (Berkshire Hathaway Inc. Shareholder Letters, 1995) stated that the book value is the historical input and intrinsic value is future output. For past book value growth to be used as growth factor in intrinsic value formula, the company should be understandable and have stable past earning. According to Pysh (2012), book value growth of the past decade can be used as the indication of intrinsic value growth in the coming decade. So, book value growth will be used as the growth criteria in the calcualtion of intrinsic value.

Graham(1975, 3) also writes that there can be two to three results based on this revised formula. Analysts could either use 3-year average of AAA rate corresponding with 3-year average earning figures or use recent bond rate corresponding with most recent inflation-aided annual earning. In both case the indicated central value would be the same. In our calculation of intrinsic value, 3-year average of AAA rate corresponding with 3-year average earning will be used.

There are different factors that should be considered while calculating the intrinsic value. They are as follows:
3.3.1   Current normal earning

The investor needs to figure out whether the earning presented in the income statements are just temporary or normal earning. Sometimes earning might get distorted by many factors like

some extraordinary income in the particular year, recent economic recession or boom. The job of the investor is to make sure that the earning in the income statements represents the normal earning for the period. So, 3-year average earning will be used in our calculation of intrinsic value.

3.3.2 Estimated growth

It is essential to estimate the growth factor of earning in for next seven to ten years. Average book value growth of a stable and understandable company in the past could be used as a growth criteria in the intrinsic value formula.

3.3.3 Required rate of return and its adjustment

Required rate of return of 4.4% in the formula shows that minimum return from any investment suggested by Graham (1975, 3)should be at least 4.4%. This 4.4% rate of return Graham used is the historical rate of return on risk-free investments. Similarly, the present risk-free return could be quite different than the required rate of return. To adjust the required rate of return to the present, 3-year average AAA bond rate with the maturity of 10 year is used. According to Damodaran (2011), "the risk free rate is not just a number in a discount rate computation but an opportunity cost." So, this two criteria as a whole represents the discount factor of the intrinsic value as well as the opportunity cost of choosing the particular stock instead of other securities. So these criteria discount the expected future income from the stock back to present value. Faced with the opportunity of different types of investment, there is expected to be some added return and risk in a particular stock in comparison to risk-free investment. The idea of these two added criteria in the formula is to calculate discounted future marginal income of investor by choosing to invest in the particular stock instead of risk free investments.

Calculating the intrinsic value is an important task as an investor. It helps in formulating a value of a company in which one intends to invest. Besides from the intrinsic value based on future earnings, growth and interest rates, investors should also ensure that the company has a viable financial structure and its debt position is not detrimental. For this reason, investors are directed first to select the stocks based on the analysis described in section 4. Investors should be as conservative as possible in their investment decision because in this way they are protecting themselves from different types of risks like market downturn which could wipe out the principal value of the investment. So, the margin of safety principle discussed subsequently aims to describe the process after the calculation of intrinsic value.

3.4   Margin of safety

Investors should never overpay for their investment no matter how exciting an investment might seem. As Graham and Dodd (2009, 48) set forth "the aim of any investor should be to pay a good deal less than intrinsic value, so as to provide a margin of safety."

"Value investing is the practice of purchasing securities or assets for less than they are worth- the proverbial dollar for 50 cents. Investing in bargain-priced securities provides a "margin of safety"-room for error, imprecision, bad luck, or the vicissitudes of the economy and stock market"(Graham & Dodd 2009, xiii).

"The margin-of-safety idea becomes much more evident when we apply it to the field of un-dervalued or bargain securities. We have here, by defination, a favorable difference between price on the one hand and indicated or appraised value on the other. That difference is the safety margin. It is available for absorbing the effect of miscalculations or worse than average luck"(Graham 1973, 517-518).

"Assume in a typical case that the earning power is 9% on the price and that the bond rate is 4%; then the stockbuyer will have an average annual margin of 5% accruing in his favor. Over a ten-year period the typical excess of stock earning power over bond interest may aggregate 50% of the price paid. This figure is sufficient to provide a very real margin of safety- which, under favorable conditions, will prevent or minimize a loss"(Graham 1973, 514-515).

Margin of safety basically means the rate of discount at which stock is selling in comparison to its minimum intrinsic value. The main motive of applying a margin of safety is to have both safety and profit opportunity from an investment. Since, in this thesis undervalued stocks are selected for further analysis, which means stocks with earning rate of more than 11% is se-lected in the analysis.(Stocks with PE of 9 means earning rate of 11.11%) While AAA bond rate with 10 year maturity at 2002 is 5.16%, earning power over bond interest is over 5%. As Gra-ham(1973,515) suggested this figure is "sufficient to provide real margin of safety."

 Margin of Safety= Intrinsic value/ Market price

So the aim of the investor should be to pay a good deal less than the intrinsic value. To calcu-late the margin of safety any stock possess, the calculated intrinsic value of a stock will be divided by its market price. If the calculated ratio is more than 1 then there is margin of safe-ty. The aim is to pay less than intrinsic value. So, this ratio should be as high as possible. The degree of margin of safety any stock should have is a matter of subjective judgement. Any stock with margin of safety of 50% has a wider safety net than a stock with 25% margin of safety. Stock with wider margin of safety will be selected for further analysis.

4   Discounted cash flow – Intrinsic value calculation

Discounted cash flow valuation method is a method of valuing a company, asset or project by using the concept of time value of money. It is used to evaluate the profitability of an investment opportunity. In this method, all future cash inflow and outflow are estimated and discounted by using an appropriate discount rate to their present value. Weighted average cost of capital is commonly used as the discount rate to reflect the riskiness of the estimated cash flow and time value of money. The cash flows varies from asset to asset- coupons and the face value for bonds, dividends for stocks and after-tax cash flows for a real project. More riskier the cashflows from these assets, higher discount rates is to be used.

"Discounted cash flow valuation can be used to estimate the intrinsic value of an assets based on its fundamentals. What is intrinsic value? For lack of a better defination, consider it the value that would be attached to the firm by an all-knowing analyst, who not only estimates the expected cash flows for the firm correctly but also attaches the right discount rate to these cash flows and values them with absolute precision. While market prices can deviate from intrinsic value(estimate based on fundamentals), it is expected that the two will converge sooner rather than later."(Damodaran 2002, 12)

There are many discounted cash flow models in existence. And these models differs from one another only on few dimensions. This valuation method can be used to value equity stake in a company or to value a firm as a whole. As this thesis is concerned with the long term investment rather than short term investment, valuing a whole company is relevant rather than valuing just the equity stake. To find the intrinsic value of a stock, it seems quite relevant to value an entire firm first and then divide the value by the number of share outstanding to get the value of each stock.

According to Damodaran (2002, 13) "The value of the firm is obtained by discounting expected cash flows to the firm (i.e., the residual cash flows after meeting all operating expenses, reinvestment needs, and taxes, but prior to any payments to either debt or equity holders) at the weighted average cost of capital (WACC), which is the cost of the different components of financing used by the firm, weighted by their market value proportions."

$$\text{Value of Firm} \ = \ \sum_{t=1}^{t=n} \frac{\text{CF to Firm}_t}{(1+\text{WACC})^t}$$

where,
n=life of the asset
CF to Firm$_t$= Expected cash flow to firm in period t

WACC= Weighted average cost of capital

According to this valuation method, the value of a firm is simply the present value of future cashflows discounted at the weighted average cost of capital. Besides from the cashflows and discount rate, growth is also an important characteristics of many companies. And while valuing a firm, an investor or analyst should allow the closure and estimate the value of the firm at the end of the forecasted period. "We can estimate the value of an asset by taking the present value of the expected cash flows on that asset. Consequently, the value of any asset is a function of the cash flows generated by that asset, the life of the asset, the expected growth in the cash flows, and the riskiness associated with the cash flows"(Damodaran 2012, 87-88).

So, there are four main components in intrinsic value calculation of a firm while valuing through discounted cash flow valuation. The first component is the cashflow from existing assets or free cash flow to the firm. Second is the growth, with growth in operating income being the key component while valuing a firm. The third component is the discount rate or weighted average cost of capital in firm valuation. The final component is the terminal value. These four components are described in details as follows;

4.1 Cashflow from existing assets or Free cash flow to the firm

Business have many claim holder besides investors, including bondholders and banks. While free cash flow to equity is a method to measure the cash flow generated by the existing asset to the equity investors. Whereas, free cash flow to firm measures the cash flow generated by the assets to equity investors, bondholders and banks. So, the free cash flow to the firm is the cashflows left after meeting all operating expenses, reinvestment needs and taxes, but prior to any payments to either debt or equityholders. According to Damodaran (2012, 109),"free cashflow to the firm is defined as the cash flow left over after operating expenses, taxes, and reinvestment needs, but before any debt payments (interest or principal payments)."

Free Cash flow to firm (FCFF) = After-tax operating income – Reinvestment needs

To calculate free cash flow to firm after-tax operating income and reinvestent needs are taken into account because a firm would have the cash which is left after all operating expenses, taxes and reinvestments needs. After-tax operating operating income are income of the company left after all the operating expenses are paid and tax is substracted. It is the earning of the company before interest expenses is deducted.

After tax operating income= Earning before Interest and tax(1- tax rate)

$$= EBIT(1\text{-}t)$$

And, Reinvestment are those investments in the assets of the company, that reduces cash flow to equity investors, but it provides a payoff in terms of future growth. Net capital expenditure and change in working capital are the components of reinvestment. Net capital expenditure is derived by subtracting depreciation form capital expenditure. Since, depreciation is just accounting expenses, it is not a cash expense and hence can be added back to the cash flow available for the company. Change in working capital represents the cash or capital tied up in current assets. Increase in working capital means cash are tied up in form of inventory, account receivable or other current assets or cash are paid for accounts payable or other short term liabilities. In contrast, Decrease in working capital means cash are available due to decrease in inventory, account receivable or other current assets or cash is overdue to pay to accounts payable or other accounts payable. Reinvestment needs can be written as follows:

Reinvestment needs= Capital expenditure – Depreciation + change in working capital

4.2   Growth in operating income

Estimating the growth in operating income is not a simple task. It is always complex to determine what facts or figures to use while estimating growth. Whether to use historical growth rate or use the estimates of growth produced by some equity research analysts are some dillema of an analysts while calculating the future growth rate. This options might not always be the useful predictors of future growth since this estimates can either be biased and overestimated in buoyant times and underestimated in depressed economy. So, using the fundamentals of the company could be the best option while estimating the growth of the companyand its operating income. New investments that expand the business and improved efficiency on exisitng investments are considered as the fundamental growth factors of its operating income.Normally, new investments of the company or reinvestment bring the growth in operating income.While, sometimes increase in efficiency can result in growth in operating income. But, a firm cannot always increase efficiency. After some period a firm will revert to its normal efficiency and remain stable. So, growth in operating income is mainly related to total reinvestment made into the firm and the return earned on capital invested (Damodaran 2012, 290).

Growth in operating Income = Reinvestment rate x Return on capital

The reinvestment rate measure how much a firm is plowing back to generate future growth. It is the amount of reinvestment needs of the company in proportion of its after tax operating income.

Reinvestment rate= Reinvestment need/ After-tax operating income

"The return on capital is often based on the firm's return on capital on existing investments, where the book value of capital is assumed to measure the capital invested in these investments. Implicitly, we assume that the current accounting return on capital is a good measure of the true measure of the true returns earned on existing investments, and that this return is a good proxy for returns that will be made on future investments"(Damodaran 2012, 291).

Return on Capital= After-tax operating income(t)/ Book value of invested capital(t-1)

where,

t=time period

Book value of invested capital =Book value of Debt+ Book value of Equity

4.3   Weighted average cost of capital or Discount rate

Weighted average cost of capital (WACC) is firm's cost of capital weighted according to the financing method it uses either debt or equity. It is the weighted average of the cost of equity and cost of debt, with the weights reflecting the proportional use of each source of financing. A company might use different sources of capital such as equity from common or preferred shareholder, debts from financial institution or issue bonds. WACC is calculated by multiplying the proportion of each financing measure it uses with the cost of that financing measure and taking the sum of the results (Weighted Average Cost of Capital- WACC. 2016). The formula to calculate WACC is presented in the formula below:

$$WACC= [K_e * E/V] + [K_d * D/V *(1-t)]$$

Where,

K_e = Cost of equity

K_d =Cost of debt

E = market value of the firm's equity

D = market value of the firm's debt

V = E+D = total market value of the firm's financing

t = corporate tax rate

Weighted average cost of capital is the discount rate, used to reflect the risk in the cash flow to the firm. Higher WACC represents higher risk and lower value of the firm and vice versa. Different inputs of WACC are described as follows:

4.3.1   Cost of equity

Cost of equity is the rate of return that any investor expect from the equity investment. Investors would expect higher return if the risk is higher in their equity investment and lower return if the risk is lower. So, this return that investors expect from the company is the cost of equity for the firm. Cost of equity is an implicit term because it is unobservable, unlike debt, which have the fixed interest rate. And risk in the company is different in the eye of

each investors and demand different return from the investment. Investors have two choice, either to invest in risk-free investment or take the added risk and return from the equity investment. And among many equity investment, investors could choose the particular company which might have some added risk. To reflect the added risk of the equity investment, equity market premium prevailing in the market is used. Equity market premium is the premium that investors demand for investing in risky assets (equity), relative to the risk-free rate. To reflect the relative risk in individual investment beta is used. "Beta is a measure of the volatility of trading price of a firm or portfolio in comparison to the market as a whole"(Beta. 2016). Steps to calculate beta is described in methodology and data section. So, the cost of equity can be presented as follows:

Cost of equity= Risk-free rate + Beta * Equity market premium

4.3.2 Cost of Debt

While equity investors bears the operational risk of the firm and demand the equity risk premium on the investment, banks or financial institutions who lend capital to the firm also bears the risk of default of the firm and their lendings. So, lenders demand default spread for the added risk they bear. The greater the perceived risk of default greater the default spread and cost of debt will be. There are three input while calculating in the cost of debt. First is the risk-free rate, which lenders would get even if they don't bear any risk in their lendings. Second, is the default spread which lenders demand for the added risk in company. There are two approaches while estimating the default spread of the company. Either bond rating from an established rating agency can be used or synthetic rating can be used if the firm is unrated and has debt outstanding. Synthetic rating is used to represent the default risk of the firm where interest coverage ratio is used to estimate the riskiness of capital in the firm. Higher interest coverage ratio is better for the company and will yield higher rating.Third input in the cost of debt calculation is the marginal tax rate. Interest that the firm pay on debt is tax deductible. Interest saves tax and work for the benefit of the firm. After tax cost of debt should be calculated, so that tax rate is taken into account (Damodaran 2011, 45). The cost of debt is calculated as follows:

Cost of Debt = (Risk-free rate + Default spread) (1-tax rate)

4.3.3 Market value of the firm's Capital

The proportion of capital financed either by equity or financial institution is figured out to determine the weight they have on cost of equity or cost of debt respectively. The market value of equity and debt is used, rather than book value. Market value of equity is easy to calculate because trading price of equity is easily available from stock exchange and share

outstanding of the firm is easily available from the annual report. Market value of the equity is calculated as follows:

Equity market value= Market price * share outstanding

Similarly, market value of debt is the outstanding debt of the company. It is not traded in the market as equity, but analyst use the book value of debt, which is available from the fianncial statement of the firm.

4.4   Terminal value

Publicly traded companies have an infinite life and free cash flow to the firm cannot be calculated for infinite time period. So, terminal value should be calculated. Terminal value impose the closure in valuation models by stopping the estimation of cash flow at some period in the future and estimating all the cash flow beyond that point. Also, the firm reinvests some portion of their earning or more than their earning for their future growth. While estimating the terminal value of the firm, this growth factor of the firm should be taken into account. A firm might grow at a high rate for some period in time, but, it becomes more difficult to maintain the high growth rate and eventually will grow at a rate less than or equal to the growth rate of the economy. "Note that the fact the cash flows grow at a constant rate forever constrains this rate to be less than or equal to the growth rate of the economy in which you operate"(Damodaran 2012, 90). The stable growth rate, which can be sustained for infinite time will allow to estimate the terminal value. Perpetual growth model draws on a simple present value equation to arrive at terminal value (Terminal value, 2016):

Terminal value$_n$ = Cashflow in year$_{(n+1)}$ / (Discount rate – Perpetual growth rate)

There are three inputs in terminal value calculation: Free cash flow, discount rate and growth rate. All these inputs are calculated separately than in high growth period. Cashflow in year$_{(n+1)}$ is the free cash flow to the firm from the period when the firm continues to grow at a stable growth rate. Discount rate being used in the terminal value calculation is weightd average cost of capital. As could be derived from the section: growth in operating income, reinvestment rate and return on capital are the component of growth. So, growth is a function of reinvestment and return. It could be written as follows:

Growth = Reinvestment rate * Return on capital

So, terminal value can be written simply as follows:

Terminal value= [EBIT$_{n+1}$(1-t) * (1- Reinvestment rate)] / [WACC$_n$ – (Reinvestment rate * ROC)]

Therefore, according to discounted cash flow method, intrinsic value of a firm is the sum of discounted value of all expected cash flows in high growth period and discounted value of the

terminal value in stable growth period.The formula presented below is used to calculate the intrinsic value of a firm:

$$\text{Value of a Firm} = \sum_{t=1}^{t=n} \frac{CF_t}{(1+k_c)^t} + \frac{\text{Terminal Value}_n}{(1+k_c)^n}$$

where,

n = year in which terminal value is calculated

CF_t = Free cash flow to firm at time (t)

K_c = cost of capital

5 Other factors affecting company and stock price

There are many factors in the economy that affects the company and stock price. They are briefly described as follows:

5.1 Inflation

Inflation means increase in the general price level of the goods and service in the economy. Inflation leads to the decrease in the purchasing power of the consumers. This might affect the company as higher price erodes the purchasing power of consumers and affects the sales and profitability of the company. Inflation on a sustainable basis is considered essential, but sudden inflation or hyperinflation might be considered bad for the company and the economy as a whole. Inflation on the other hand could be a good aspect for a company. Company with good economic goodwill could afford to increase price of its products and also increase in sales and profit in comparison to those companies without any economic goodwill.

5.2 Stock market crash and Market bubble

Stock market crash and market bubble also have an impact on the stock price. It might drive the market price of share too low or too high and have no relation to the fundamentals of the company. Sometimes these events also damage the fundamentals of the company.

6 Methodology and data

6.1 Undervalued intrinsic value

This thesis is about selecting an undervalued stock and calculating the intrinsic value of selected companies. The value investment principle formulated by Benjamin Graham serves as a basis for undervalued stock selection. Many books and writings of Graham were studied. Similarly, books and writings of few other investment and economic profesionals were studied

and referred in this research to clearify different subjects in this thesis. In this research process, first undervalued stocks listed on Nasdaq Helsinki were selected as per the guidelines suggested by Graham (1973, 385-386). Stocks were selected that could be suitable for enterprising investor. The table below shows the undervalued stock selection criterias in a table format.

			Company
Price	Earning	PE (9 or less)	PE ratio
Current earning	Earning 3 year ago	Growth	Current earning compared to earning 3 years ago
			Current dividend
Current assets	Current liabilities	Current ratio(1.5 or more)	Current ratio
Debt	Net current assets	Ratio(1.1 or less)	Debt/Net current assets
Market Cap	Net tangible assets	Ratio(1.2 or less)	Stock price/Net Tangible assets
	3 years average earning		PE
	Book value		PB
			PE*PB

Table 2: Undervalued stock selection

The main criterias in this table are PE ratio, Current earning compared to earning 3 years ago, Current dividend, current ratio, Debt to Net current ratio and Stock price to Net tangibel assets ratio. The criteria outside the table format are the alternating criteria that are be used instead of PE ratio and Stock price to Net tangible assets ratio. All these criterias are described in detail in section 4.

Many companies were selected in random from Nasdaq Helsinki. Their market price information were gathered from the website of Nasdaq Helsinki. And the data and information about the particular stock were gathered from the annual report of the corresponding company. These date were entered into the table format presented above.

Those companies that meet the criteria described in section 3.2 are selected for further analysis. The intrinsic value of the selected companies is to be calculated next in the analysis. The formula below shows different criteria while calculating the intrinsic value.

 Intrinsic Value= Normal current earning * (8.5+ 2*Growth) * 4.4/AAA Bond rate

The main criterias in this formula is normal current earning, growth multiplier and AAA bond rate. These criterias are described in detail in the section 3.3 of this thesis. This is the simple formula that was presented by Graham (1975, 3) in his writing to calculate the intrinsic value of a stock.

Graham(1973, 585) also warned that he does not "suggest this formula gives the "true value" of a growth stock, but only approximates the results of more elaborate calculation in vogue."

This is why being conservative in the purchase of stock and applying margin of safety come into play. Since, the intrinsic value calculated is the approximate of the "true value" of a stock, applying margin of safety will provide a room for error, imprecision, bad luck, or the vicissitudes of the economy and stock market. The amount of margin of safety any investor should have is a matter of subjective judgement. Stock with a margin of safety of 50% will have a wider safety net than a stock with 25% margin of safety. Stocks with wider margin of safety is selected for further analysis. The ratio below is used to calculate margin of safety in a stock. If this ratio is more than 1, then a stock possess a margin of safety. The aim is to find a stock with higher ratio of intrinsic value to market price.

Margin of Safety= Intrinsic value/ Market price

6.2   Discounted cash flow

Discounted cash flow method is used to calculate the intrinsic value, which could serve as a comparison with the undervalued intrinsic value. Main base for the calculation of intrinsic value through discounted cash flow is the literratures and books of Aswath Damodaran. Similarly, many other books,online resources and literature are studied to present the topic and points clearly in this thesis. Stock price information of the company are gathered from Nasdaq Helsinki. Financial information are gathered from the financial statement of the company. Similarly, various information such as rates are gathered from the online resources producedby goverment officials, financial institution and various organization.

Information required to calculate intrinsic value are collected in the table format in excel as follows:

Year	After-tax operating Income	Expected growth rate	ROC	Reinvestment rate	Reinvestment	FCFF	Cost of capital	Present value
1								
2								
3								
4								
5								
Beyond								

Table 3: Discounted Cash flow- Intrinsic value calculation

The main input of the table are after-tax operating income, expected growth rate, Return on capital, reinvestment, reinvestment rate, free cash flow to firm, Weighted Average cost of capital, terminal value and present value of all these inputs. In the table, beyond represents terminal value. All of these inputs are described in detail in section 4, discounted cash flow – intrinsic value calculation.

Intrinsic value is calculated through discounted cash flow method, so that the result can be compared with undervalued intrinsic value. Those stock, which have the margin of safety of more than 1 are selected and theirs intrinsic value are calculated through discounted cash

flow method. First of all, Information are gathered in different excel table (Appendix 1-8) which have the detailed description of each input presented above in table. For the calculation of after-tax operating income and free cash flow to firm, datas related to tax rate, capital expenditure, depreciation, change in working capital and operating income are collected. Tax rate used in the calculations is 29% (OECD Corporate Income Tax rates, 1981-2013, 2013). Return on capital is calculated first to calculate growth in operating income. To calculate weighted average cost of capital, cost of equity, cost of debt and market value of equity and debt are calculated with the formula presented in 4.3. Most of the information required to calculate WACC are available in financial statement, but, risk-free rate, beta and synthetic rating is calculated separately. Risk-free rate is calculated from the information available from U.S. Department of the Treasury online page. (HQM Corporate Bond Yield Curve Par Yields: 1984-Present, 2016). 8 month beta of each stock is calculated in excel and benchmark index used for the calculation is OMXH25, which is "leading share index and consists of the 25 most actively traded stocks on Helsinki Stock Exchange"(Overview, OMX Helsinki 25 (OMXH25)). To calculate beta, the percentage change of stock price and index price are first recorded in excel table and then covariance of two array (stock price change and index change) is divided by variance of the array of index. "The calculation of beta through regression is simply the covariance of the two arrays divided by the variance of the array of the index"(McNulty, Preliminary Steps & Calculating Beta, 2015). Calculation of beta in excel table format can be found in appendix 12 and 13. Synthetic rating (Appendix 11)is calculated through the guideline given by Aswath Damodaran in the book Investment Valuation (Damodaran 2012, 212-213). Data related to Equity market premium is fetched from document, Equity Market Risk Premium (EMRP) on Finnish stock market(pwc 2015, 9).

Terminal value is calculated through formula presented in section 4.4 and different financial information presented in table below:

High versus stable growth phases

	High Growth	Stable Growth
Length of High growth period		
Growth rate		
Debt ratio used in cost of capital calculation		
Beta used for stock		
Risk-free rate		
Risk Premium		
Cost of Debt		
Tax rate		
Cost of Capital		
Return on Capital		
Reinvestment Rate		

Table 4: Terminal value calculation assumption (Damodaran 2011, 53)

To calculate terminal value, first length of high growth and stable growth period and growth rate in each period is figured out. Since, terminal value is calculated to represent all the free cash flow to firm in the stable growth period, different inputs such as debt ratio, beta, risk-

free rate, risk premium, cost of debt, tax rate, cost of capital, return on capital and reinvestment rate are calculated separately or some inputs are used as same as in the high growth period. Many assumptions should be made while calculaitng terminal value. For the stocks analyzed, 5 years will be used as the period of high growth. In stable growth period, growth rate applied will be 5% as a simple rule to keep growth rate less or equal to the growth of economy or risk-free rate (Damodaran 2011, 52). Beta will converge to 1 in stable growth period as the company and its stock price will begin to move with market index in the long run. Risk-free rate, risk premium and tax rate used in the stable growth period will be the same. And, debt ratio, cost of debt, cost of capital, return on capital and reinvestment rate vary according to company and these assumptions will be made while analyzing each stocks. In the stable growth period, it will be assumed that there will be no excess return (return on capital = cost of capital) (Damodaran 2011, 53)

Finally, present value of all cash flow in high growth period and stable growth period is calculated by discounting it with cost of capital. Then, intrinsic value is calculated with the formula presented in section 4.5.

For this thesis and the formulas to prove reliable, adjusted price of the stock and financial results of the particular company will be examined from the year 2002 to 2016. Similarly, the intrinsic value calculated through undervalued intrinsic value and discounted cash flow method will be compared. If those selected stocks if bought after these analysis, shows an increase in market price and favorable financial results then these formulas and ananlysis would prove reliable. Websites of Nasdaq Helsinki will be used as the reference of the data related to adjusted prices of stock and for financial result, annual reports of the company will be checked to gather earning and dividend data of the company.

7   Empirical Analysis of Intrinsic value of undervalued stock

Firstly, to select the undervalued companies, information about many public finnish companies will be gathered in the table presented above. Then, stocks meeting all criteria of undervaluation will be choosed and its intrinsic value is calculated with the formula presented in section 5.

7.1   Undervalued stocks selection

Datas of different companies are presented in the table as follows to select an undervalued stocks. In this section, those stocks which are selected to perform further analysis are presented. Datas of other companies which were analysed but does not pass the test of undervaluation are presented in appendix 1-8.

			Yit	
Price	Earning	PE (9 or less)	PE ratio	8,11
17,35	2,14	8,11		
Current earning	Earning 3 year ago	Growth	Current earning compared to earning 3 years ago	54,21%
2,14	0,98	54,21		
			Current dividend	0,85
Current assets	Current liabilities	Current ratio(1.5 or more)	Current ratio	189,37%
779,32	411,52	1,89		
Debt	Net current assets	Ratio(1.1 or less)	Debt/Net current assets	31,78%
116,90	367,80	0,32		
Market Cap	Net tangible assets	Ratio(1.2 or less)	Stock price/Net Tangible assets	141,93%
500,86	352,90	1,4192763915		
	3 years average earning	1,88	PE	9,25
	Book value	353,63	PB	1,42
			PE*PB	13,09

Table 5: Undervalued stock selection- Yit

			Marimekko	
Price	Earning	PE (9 or less)	PE ratio	7,57
8,7	1,15	7,57		
Current earning	Earning 3 year ago	Growth	Current earning compared to earning 3 years ago	46,96%
1,15	0,61	46,96		
			Current dividend	0,65
Current assets	Current liabilities	Current ratio(1.5 or more)	Current ratio	260,28%
17,93	6,89	2,60		
Debt	Net current assets	Ratio(1.1 or less)	Debt/Net current assets	47,43%
5,24	11,04	0,47		
Market Cap	Net tangible assets	Ratio(1.2 or less)	Stock price/Net Tangible assets	182,01%
23,32	12,81	1,82		
	3 years average earning	0,90	PE	9,63
	Book value	15,24	PB	1,53
			PE*PB	14,74

Table 6: Undervalued stock selection- Marimekko

			Olvi	
Price	Earning	PE (9 or less)	PE ratio	14,71
22,5	1,53	14,71		
Current earning	Earning 3 year ago	Growth	Current earning compared to earning 3 years ago	7,19%
1,53	1,42	7,19		
			Current dividend	0,9
Current assets	Current liabilities	Current ratio(1.5 or more)	Current ratio	158,42%
44,58	28,14	1,58		
Debt	Net current assets	Ratio(1.1 or less)	Debt/Net current assets	
Market Cap	Net tangible assets	Ratio(1.2 or less)	Stock price/Net Tangible assets	93,85%
43,89	46,77	0,9384518336		
	3 years average earning	1,92	PE	11,72
	Book value	56,52	PB	0,78
			PE*PB	9,10

Table 7: Undervalued stock selection- Olvi

These three stocks meet the undervaluation criteria described in section 3.2. These stocks were selected for further analysis, whose intrinsic value will be calculated next.

7.2   Intrinsic value Calculation

Three stocks are selected as an undervalued stocks in section 7.1. To calculate the intrinsic value of these stocks, first growth of every stocks will be calculated. Book value growth of the stock in the past will be used as the growth factor as described in section 5. 3-year average earning per share is another variable used in the calculation of intrinsic value. It is already calculated while selecting the undervalued stocks. 3-year average AAA bond rate is used in the formula. 3-year average AAA bond rate with the maturity of 10 years as on 30th April 2002 is 7,09%. (HQM Corporate Bond Yield Curve Par Yields: 1984-Present 2016)

7.2.1   YIT

Normal current earning of the company is €1,87 per share and its growth rate is 12,86%. So, the calculation process presented below indicates the intrinsic value of the company is €38,28 per share.

Intrinsic Value= Normal Current Earning * (8,5 + 2*Growth) * 4,4/ AAA Bond rate
Intrinsic Value= 1,87 * (8,5 + 2* 12,86) * 4,4/ 7,09
Intrinsic Value= 38,28

7.2.2   Marimekko

Normal current earning of the company is €0,90 per share and its growth rate is 10,24%. So, the calculation process presented below indicates the intrinsic value of the company is €16,24 per share.

Intrinsic Value= Normal Current Earning * (8,5 + 2*Growth) * 4,4/ AAA Bond rate
Intrinsic Value= 0,9 * (8,5 + 2* 10,24) * 4,4/ 7,09
Intrinsic Value= 16,24

7.2.3   Olvi

Normal current earning of the company is €1,92 per share and its growth rate is 2,79%. So, the calculation process presented below indicated the intrinsic value of the company is €16,78 per share.

Intrinsic Value= Normal Current Earning * (8,5 + 2*Growth) * 4,4/ AAA Bond rate
Intrinsic Value= 1,92 * (8,5 + 2* 2,79) * 4,4/ 7,09
Intrinsic Value= 16,78

7.3   Margin of Safety

Margin of Safety is calculated to find how safe a share of a company is, in relation to its price. To calculate the margin of safety any stock possess, the calculated intrinsic value of the stock will be divided by market price of the stock. Margin of Safety of those 3 selected stocks will be calculated.

7.3.1   Yit

Margin of Safety= Intrinsic value/ Market Price
Margin of Safety= 38,28/17,35
Margin of Safety= 2,20

7.3.2   Marimekko

Margin of Safety= Intrinsic value/ Market Price
Margin of Safety= 16,25/8,7
Margin of Safety= 1,87

7.3.3   Olvi

Margin of Safety= Intrinsic value/ Market Price
Margin of Safety= 16,78/22,5
Margin of Safety= 0,74

Finally, an institutional investor performing these analysis in 30 April, 2002 will choose Yit and Marimekko. These 2 stocks pass the test of undervaluation criteria and their intrinsic value is greater than the market price at which they are trading at that time period. If an investor could obtain a good financial result in the upcoming years by investing in these 2 stocks, then the analysis suggested in this thesis would prove relaible. In the following section, results from investment in the suggested stocks will be investigated and the result of this analysis method will be examined with that of discounted cash flow method.

8   Empirical analysis of Intrinsic value - Discounted Cash flow method

From the analysis, undervalued intrinsic value, 2 stocks pass the test of undervaluation criteria. Therefore, these 2 stocks are further analysed through discounted cash flow method and their intrinsic value is figured out. Since, YIT and Marimekko pass the test of undervaluation,

their intrinsic value through discounted cash flow method will be calculated. To calculate the intrinsic value, financial information of the company and other data are entered in the table 3 presented in section 6.2 and data required to calculate terminal value is calculated in the table 4 presented in section 6.2. Calculation of different input of intrinsic value can be found in appendix 9 and 10. For the calculation of terminal value, different assumptions are made. Assumptions about some inputs are described in section 6.2 and some assumptions about the terminal value of each company is described below.

8.1 YIT

The first table below show the data used to calculate the terminal value and second table shows the intrinsic value calculation process.

High versus stable growth phases

	High Growth	Stable Growth
Length of High growth period	Next 5 years	After 5 years
Growth rate	14,86%	5%
Debt ratio used in costof capital calculation	18,10%	18,10%
Beta used for stock	0,337	1
Risk-free rate	7,09%	7,09%
Risk Premium	5,03%	5,03%
Cost of Debt	6,10%	6,10%
Tax rate	29%	29%
Cost of Capital	7,98%	7,98%
Return on Capital	15,36%	7,98%
Reinvestment Rate	96,73%	62,67%

Table 8: Terminal value calculation assumption- Yit

In the table above, data required to calculate terminal value are presented. Debt ratio is assumed to stay the same as 18,1%, and it cause cost of debt and cost of capital to remain the same as 7,98%. Return on capital is assumed to be similar to cost of debt (Damodaran 2011, 53). So, reinvestment rate changes to 62,67% to adjust the change in growth rate and return on capital.

YIT								
Year	After-tax operating Income	Expected growth rate	ROC	Reinvestment rate	Reinvestment	FCFF	Cost of capital	Present value
1	70,82	14,86%	15,36%	96,73%	68,50	2,32	7,98%	2,15
2	81,34	14,86%	15,36%	96,73%	78,68	2,66	7,98%	2,28
3	93,42	14,86%	15,36%	96,73%	90,37	3,06	7,98%	2,43
4	107,30	14,86%	15,36%	96,73%	103,79	3,51	7,98%	2,58
5	123,24	14,86%	15,36%	96,73%	119,21	4,04	7,98%	2,75
Beyond	129,41	5,00%	7,98%	62,67%	81,10	1621,90	7,98%	1104,93
							Total	1117,12
							Share outstanding	28,868
							Intrinsic value	38,69758136

Table 9: Discounted Cash flow- intrinsic value calculation- Yit

So, the intrinsic value of YIT as calculated through Discounted cash flow method is € 38,69.

8.2   Marimekko

The first table shows the inputs used to calculate teh terminal value and the second table shows the intrinsic value calculation process.

High versus stable growth phases		
	High Growth	Stable Growth
Length of High growth period	Next 5 years	After 5 years
Growth rate	10,66%	5%
Debt ratio used in costof capital calculation	18,34%	18,34%
Beta used for stock	0,261	1
Risk-free rate	7,09%	7,09%
Risk Premium	5,03%	5,03%
Cost of Debt	5,57%	5,57%
Tax rate	29%	29%
Cost of Capital	7,59%	7,59%
Return on Capital	15,22%	7,59%
Reinvestment Rate	70,02%	65,91%

Table 10: Terminal value calculation assummption- Marimekko

In the table above, data required to calculate teminal value are presented. Debt ratio us assumed to stay the same as 18,34%, and it cause cost of debt and cost of capital to remain the same as 7,59%. Return on capital is assumed to be similar to cost of debt. So reinvestment rate changes to 65,91% to adjust the change in growth and return on capital.

MMO

Year		After-tax operating Income	Expected growth rate	ROC	Reinvestment rate	Reinvestment	FCFF		Cost of capital	Present value
	1	3,12	10,66%	15,22%	70,02%	2,18	0,93		7,59%	0,87
	2	3,45	10,66%	15,22%	70,02%	2,42	1,03		7,59%	0,89
	3	3,82	10,66%	15,22%	70,02%	2,67	1,14		7,59%	0,92
	4	4,22	10,66%	15,22%	70,02%	2,96	1,27		7,59%	0,95
	5	4,68	10,66%	15,22%	70,02%	3,27	1,40		7,59%	0,97
Beyond		4,91	5,00%	7,59%	65,91%	3,24	64,71		7,59%	44,89
								Total		49,49
								Share outstanding		2,68
								Intrinsic value		18,46622986

Table 11: Discounted cash flow- intrinsic value calculation- Marimekko

So, the intrinsic value of Marimekko as calculated through Discounted cash flow method is €18,46.

9   Examination of the results

The aim of calculating intrinsic value is to estimate the value of a company and thereby, estimate the future earning or cash flow per share. To justify that intrinsic value calculated on 30th April 2002 is a reliable number, at first this thesis will compare the intrinsic value calculated through both method, then these intrinsic value will be compared with market price of stock on 30 April 2002 and earning and dividend record on each share from 2002 to 2015 discounted back to 2002. If the discounted earning and dividend of a share is equivalent or greater than the market price of share on 30th April 2002, the share bought on this date

would prove profitable. Besides from the earning and dividend received on each share, investors also have stock traded in the stock market which could be traded for money at the current market price or still hold on to the stock of the company and have a claim on future earning and dividend produced by the business. So, the price trend of these 2 stocks from 2002 to 2016 will also be presented to show the growth of market price of a share at this period of time.

First, the earning and dividend record of the stocks will be presented to compare with the market price and intrinsic value . Then, adjusted share price of each stock will be presented. Adjusted share price will adjust the price to stock dividends and stock splits.

9.1 Intrinsic value comparison

The table below shows the intrinsic value calculated through two method: undervalued stock selection and discounted cash flow method and also shows how much value calculated through latter method deviate from the former method. Undervalued intrinsic value method focus on current earning per share and past growth in book value, while discounted cash flow focus on free cash flow to firm and growth is based on reinvestment and return on capital. Although, being quite different approach, both method provides almost similar intrinsic value.

Company	Undervalued-Intrinsic value	Discounted Cash flow-intrinsic value	Deviation
YIT	38,28	38,69	1,08947108
Marimekko	16,24	18,46	

Table 12: Comparison of two method of intrinsic value calculation

9.2 Financial result

Financial result specifically, earning and dividend record of two selected companies are presented below:

9.2.1 Yit

Year	Earning	Dividend
2002	1,47	0,9
2003	1,63	1,2
2004	3,2	1,4
2005	4,92	2,2
2006	5,4	2,6
2007	7,08	3,2
2008	4,2	2
2009	2,2	1,6
2010	4,48	2,6
2011	3,96	2,8
2012	4,52	3
2013	2,24	1,52
2014	1,76	0,72
2015	1,52	0,88
Total	48,6	26,62
Discounted result	30,16	16,52

Table 13: Earning and dividend record(2002-2015)- Yit

In this table presented above, in the period 2002-2015, the nominal earning and dividend is €48,6 and 26,62 respectively. And discounted earning and dividend is 30,16 and 16,52 respectively.

Market price (30 April 2002)	17,35
Intrinsic value (Undervalued method)	38,29
Intrinsic value (DCF method)	38,69
Total Discounted Earning	30,16

Table 14: Intrinsic value comparison with Market price and Earning- Yit

The discounted earning is higher than the market price and discounted dividend received on each share is almost equal to the price paid. Besides from the earning and dividend received, each share of Yit also have a market price.

Figure 1: Market price trend of Yit share

This figure represents the adjusted price trend of Yit share from 2002 to 2016. Market price as can be seen from the figure above, is most of the time higher than the price on 30 April 2002. The share price as presented in the figure on 30 April 2002 is 4,33. It is adjusted to the stock split of 2-for-1 on 2004 and again a 2-for-1 stock split on 2006. So, the price trend presented above is adjusted to the fourfold increase in number of share. The figure present itself that the market price on 30 April 2002 is relatively small in comparison to market price at later date.

9.2.2   Marimekko

Year	Earning	Dividend
2002	1,65	0,84
2003	2,25	3
2004	2,25	1,5
2005	3,15	1,95
2006	3	1,95
2007	2,88	1,95
2008	2,76	1,65
2009	1,77	1,35
2010	2,28	1,65
2011	1,05	1,65
2012	0,42	0,75
2013	-0,36	0,75
2014	1,53	1,05
2015	0,3	1,05
Total	24,93	21,09
Discounted result	15,47	13,09

Table 15: Earning and Dividend record (2002-2015)- Marimekko

In the table presented above, in the period 2002-2015, nominal earning and dividend is €24,93 and € 21,09 respectively. The discounted earning and dividend is €15,47 and €13,09 respectively.

Market price (29 April 2002)	8,7
Intrinsic value (undervalued m	16,25
Intrinsic value (DCF method)	18,46
Total Discounted Earning	15,47

Table 16: Intrinsic value comparison with Market price and Earning- Marimekko

The discounted earning and discounted dividend from period 2002 to 2015 is higher than the market price on 29 April 2002. Besides from the earning and dividend received on each share during this period, each share of Marimekko also have a market price.

Figure 2: Market price trend of Marimekko share

The figure represents the adjusted price trend of Marimekko share from 2002 to 2016. Market price as can be seen from the figure above, is always higher than the price on 29 April 2002. The share price as presented on 29 April 2002 is 2,9. It is adjusted to the stock split of 3-for-1 on 2003. So, the price trend presented above is adjusted to the threefold increase in number of share. The figure present itself that the market price on 29 April 2002 is relatively small in comparison to market price at later date.

10   Conclusion

Intrinsic value are calculated through two method: undervalued and discounted cash flow method. Are these value a reliable number? Can any investor trust and undoubtedly invest in Finnish stock market with the help of these methods? Intrinsic value is calculated through two methods and both undervalued intrinsic value calculation method as well as discounted cash flow method show the value. Using both method to calculate the intrinsic value is suggested before investing in any public companies and meeting every undervaluation criteria and careful examination of every input of both method is necessary before investing in any company. Since, the intrinsic value calculated are above the market price of each share the analysis and method used would suggest any investor to buy two share on 2002; YIT and Marimekko. It is suggested that first any stocks should be checked if it is undervalued and then intrinsic value should be calculated. To justify that these calculation and analysis performed generate a financial gain to the investors, earning and dividend record from 2002 to 2015 are presented and also, market price of each share from 2002 to 2016 is presented. Earning and dividend record shows that purchase of each share had delivered higher earning and dividend to each investor. Earning and also the discounted earning in these period are higher than the market price on the date of analysis. Dividend and discounted dividend are almost similar or higher than the market price on the date of analysis. Similarly, share's market price trend shows that market price of each share is higher on later date than on the date of analysis. There is an upward trend in market price for few years. Investors could have certainly profit from this

upward trend or higher market price by selling the share in stock market. Share's market price would matter less to the long term investor and profiting from the rise in stock's market price would not have been the ideal option. Earning and dividend record is what long term investors care about. Financial result shows that by using these analysis and intrinsic value calculation method investors had the financial gain in the latter year.

So, these analysis have a good scope in Finnish stock market. These two method of intrinsic value calculation can be used by the investors as a tool to help them assist in buying share of any company. First, it should be checked if it is undervalued and then intrinsic value is calculated. Calculation of intrinsic value through both method is suggested because any of the method could give the intrinsic value too high and market price could be perceived too low. Following both method gives investor a chance to check again every input entered in the calculation. Some data or information entered in the calculation could be too far from reality. So, checking every input and careful calculation through each method is suggested in intrinsic value calculation.

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Figures

Tables

Appendixes

			Fiskars	
Price	Earning	PE (9 or less)	PE ratio	20,85
8,55	0,41	20,85		
Current earning	Earning 3 year ago	Growth	Current earning compared to earning 3 years ago	-78,05%
0,41	0,73	-78,05		
			Current dividend	0,31
Current assets	Current liabilities	Current ratio(1.5 or more)	Current ratio	225,01%
385	171,1	2,25		
Debt	Net current assets	Ratio(1.1 or less)	Debt/Net current assets	177,33%
379,3	213,9	1,77		
Market Cap	Net tangible assets	Ratio(1.2 or less)	Stock price/Net Tangible assets	174,29%
473,37	271,60	1,74		
	3 years average earning	0,53	PE	16,03125
	Book value	406,8	PB	1,16
			PE*PB	18,65

Appendix 1: Undervalued stock selection- Fiskars

			Citycon	
Price	Earning	PE (9 or less)	PE ratio	8,83
1,06	0,12	8,83		
Current earning	Earning 3 year ago	Growth	Current earning compared to earning 3 years ago	16,67%
0,12	0,1	16,67		
			Current dividend	0,08
Current assets	Current liabilities	Current ratio(1.5 or more)	Current ratio	26,46%
9,948	37,60	0,26		
Debt	Net current assets	Ratio(1.1 or less)	Debt/Net current assets	-1369,18%
378,59	-27,65	-13,69		
Market Cap	Net tangible assets	Ratio(1.2 or less)	Stock price/Net Tangible assets	31,95%
112,12	350,96	0,32		
	3 years average earning	0,11	PE	9,35
	Book value	356,46	PB	0,31
			PE*PB	2,94

Appendix 2: Undervalued stock selection- Citycon

			Amersports	
Price	Earning	PE (9 or less)	PE ratio	11,67
33,85	2,9	11,67		
Current earning	Earning 3 year ago	Growth	Current earning compared to earning 3 years ago	96,21%
2,9	0,11	96,21		
			Current dividend	1,1
Current assets	Current liabilities	Current ratio(1.5 or more)	Current ratio	138,39%
466,1	336,8	1,38		
Debt	Net current assets	Ratio(1.1 or less)	Debt/Net current assets	102,63%
132,7	129,3	1,03		
Market Cap	Net tangible assets	Ratio(1.2 or less)	Stock price/Net Tangible assets	337,94%
815,79	241,40	3,38		
	3 years average earning	2,44	PE	13,87
	Book value	469,3	PB	1,74
			PE*PB	24,12

Appendix 3: Undervalued stock selection: Amersports

			Metso	
Price	Earning	PE (9 or less)	PE ratio	12,39
13,5	1,09	12,39		
Current earning	Earning 3 year ago	Growth	Current earning compared to earning 3 years ago	120,18%
1,09	-0,22	120,18		
			Current dividend	0,6
Current assets	Current liabilities	Current ratio(1.5 or more)	Current ratio	129,22%
2534	1961	1,29		
Debt	Net current assets	Ratio(1.1 or less)	Debt/Net current assets	231,76%
1328	573	2,32		
Market Cap	Net tangible assets	Ratio(1.2 or less)	Stock price/Net Tangible assets	540,75%
1 838,56	340,00	5,41		
	3 years average earning	0,59	PE	22,88
	Book value	1314	PB	1,40
			PE*PB	32,02

Appendix 4:Undervalued Stock selection- Metso

			UPM kymmene	
Price	Earning	PE (9 or less)	PE ratio	10,08
38,8	3,85	10,08		
Current earning	Earning 3 year ago	Growth	Current earning compared to earning 3 years ago	0,78%
3,85	3,82	0,78		
			Current dividend	1,5
Current assets	Current liabilities	Current ratio(1.5 or more)	Current ratio	83,09%
2314	2785	0,83		
Debt	Net current assets	Ratio(1.1 or less)	Debt/Net current assets	-933,97%
4399	-471	-9,34		
Market Cap	Net tangible assets	Ratio(1.2 or less)	Stock price/Net Tangible assets	150,16%
10 038,26	6 685,00	1,50		
	3 years average earning	4,12	PE	9,43
	Book value	6786	PB	1,48
			PE*PB	13,94

Appendix 5:Undervalued stock selection-UPM Kymmene

			Konecranes	
Price	Earning	PE (9 or less)	PE ratio	14
33,6	2,4	14		
Current earning	Earning 3 year ago	Growth	Current earning compared to earning 3 years ago	12,92%
2,4	2,09	12,92		
			Current dividend	0,9
Current assets	Current liabilities	Current ratio(1.5 or more)	Current ratio	172,68%
356,917	206,70	1,73		
Debt	Net current assets	Ratio(1.1 or less)	Debt/Net current assets	36,26%
54,478	150,222	0,36		
Market Cap	Net tangible assets	Ratio(1.2 or less)	Stock price/Net Tangible assets	307,29%
504,00	164,01	3,07		
	3 years average earning	1,82	PE	18,43
	Book value	193,19	PB	2,61
			PE*PB	48,08

Appendix 6: Undervalued stock selection-Konecranes

			Fortum	
Price	Earning	PE (9 or less)	PE ratio	10,67
6,08	0,57	10,67		
Current earning	Earning 3 year ago	Growth	Current earning compared to earning 3 years ago	52,63%
0,57	0,27	52,63		
			Current dividend	0,26
Current assets	Current liabilities	Current ratio(1.5 or more)	Current ratio	105,95%
2921	2757	1,06		
Debt	Net current assets	Ratio(1.1 or less)	Debt/Net current assets	2607,32%
4276	164	26,07		
Market Cap	Net tangible assets	Ratio(1.2 or less)	Stock price/Net Tangible assets	78,88%
5 141,30	6 518,00	0,79		
	3 years average earning	0,51	PE	11,92
	Book value	6900	PB	0,75
			PE*PB	8,88

Appendix 7:Undervalued stock selection-Fortum

			Nokia	
Price	Earning	PE (9 or less)	PE ratio	39,04
17,96	0,46	39,04		
Current earning	Earning 3 year ago	Growth	Current earning compared to earning 3 years ago	21,74%
0,46	0,36	21,74		
			Current dividend	0,27
Current assets	Current liabilities	Current ratio(1.5 or more)	Current ratio	162,19%
15515	9566	1,62		
Debt	Net current assets	Ratio(1.1 or less)	Debt/Net current assets	17,45%
1038	5949	0,17		
Market Cap	Net tangible assets	Ratio(1.2 or less)	Stock price/Net Tangible assets	752,31%
85 086,04	11 310,00	7,52		
	3 years average earning	0,61	PE	29,60
	Book value	12401,00	PB	6,86
			PE*PB	203,12

Appendix 8:Undervalued stock selection-Nokia

YIT		
After-tax operating Income	70,81966	
Reinvestment rate	56,64%	
FCFF	30,70966	
Reinvestment	40,11	
	Year 1	Year 2
Non-cash current asset	660,353	742,305
Non-debt current liabilities	235,88	289,441
Non-cash working capital	424,473	452,864
Changes in non-cash working capital	28,391	
Expected growth for next 5 years	8,70%	
ROC	0,153588506	
Book value of invested capital	461,1	
Risk free rate	7,09%	
Cost of Equity	8,79%	
Cost of Debt	6,10%	
Market value of equity + Market value of Debt	611,56	
WACC	7,98%	
Synthetic rating	6,452816401	
Equity market premium on 2002	5,03%	

Appendix 9: DCF Intrinsic value inputs calculation- YIT

Marimekko

After-tax operating Income	3,11761	
Reinvestment rate	70,02%	
FCFF	0,93461	
Reinvestment	2,183	
	Year 1	Year 2
Non cash current asset	13,559	16,582
Non-debt current liabilities	6,294	6,89
Non-cash working capital	7,265	9,692
Changes in non cash working capital	2,427	
Expected growth for next 5 years	10,66%	
ROC	0,152249353	
Book value of invested capital	20,477	
Risk free rate	7,09%	
Cost of Equity	8,40%	
Cost of Debt	5,57%	
Market value of Equity+ Market value of Debt	28,558	
WACC	7,59%	
Synthetic rating	9,476018237	
Equity market premium on 2002	5,03%	

Appendix 10: DCF Intrinsic value inputs calculation- Marimekko

Table 8.6: Interest Coverage Ratios and Ratings: High Market Cap Firms

Interest Coverage Ratio	Rating	Spread
> 8.5	AAA	0.75%
6.5-8.5	AA	1.00%
5.5 –6.5	A+	1.50%
4.25- 5.5	A	1.80%
3- 4.25	A-	2.00%
2.5-3	BBB	2.25%
2- 2.5	BB	3.50%
1.75-2	B+	4.75%
1.5-1.75	B	6.50%
1.25-1.5	B-	8.00%
0.8-1.25	CCC	10.00%
0.65-0.8	CC	11.50%
0.2-0.65	C	12.70%
<0.2	D	14.00%

Appendix 11: Synthetic rating and spread of High market Cap Firms

Stocks Prices (Adjusted Close)			% Returns		Stock Beta	
Date	YIT	OMXH25	YIT	OMXH25	Beta- YIT	0,337037595
30/04/02	4,34	1576,74	0,000	-0,005		
29/04/02	4,34	1584,58	-0,014	-0,002		
26/04/02	4,4	1587,38	0,005	0,017		
25/04/02	4,38	1560,99	0,000	-0,014		
24/04/02	4,38	1582,86	0,000	-0,012		
23/04/02	4,38	1602,39	-0,011	-0,011		
22/04/02	4,43	1620,37	0,000	-0,014		
19/04/02	4,43	1643,51	0,018	-0,010		
18/04/02	4,35	1659,74	0,012	-0,017		
17/04/02	4,3	1689,08	0,005	0,007		
16/04/02	4,28	1676,58	-0,005	0,017		
15/04/02	4,3	1648,18	0,012	0,004		
12/04/02	4,25	1642	-0,012	-0,002		
11/04/02	4,3	1644,83	0,002	-0,012		
10/04/02	4,29	1664,94	0,009	-0,003		
09/04/02	4,25	1669,37	0,000	0,004		
08/04/02	4,25	1662,36	-0,023	-0,010		
05/04/02	4,35	1678,57	0,000	0,003		
04/04/02	4,35	1673,01	0,016	-0,009		
03/04/02	4,28	1687,42	0,007	0,002		
02/04/02	4,25	1683,77	0,029	0,003		
27/03/02	4,13	1678,08	0,030	0,001		
26/03/02	4,01	1676,04	0,015	-0,006		
25/03/02	3,95	1685,39	0,005	-0,001		
22/03/02	3,93	1686,32	0,008	0,001		
21/03/02	3,9	1684,63	0,000	0,007		
20/03/02	3,9	1672,35	0,005	-0,007		
19/03/02	3,88	1684,84	0,008	-0,006		
18/03/02	3,85	1695,08	0,013	0,009		
15/03/02	3,8	1679,13	0,003	-0,005		
14/03/02	3,79	1686,89	-0,010	-0,009		
13/03/02	3,83	1702,53	-0,013	0,001		
12/03/02	3,88	1700,71	0,010	-0,012		
11/03/02	3,84	1721,15	-0,008	-0,003		
08/03/02	3,87	1726,67	-0,063	0,008		
07/03/02	4,13	1713,79	0,007	0,011		
06/03/02	4,1	1695,39	0,007	0,003		
05/03/02	4,07	1690,46	-0,002	0,000		
04/03/02	4,08	1690,53	-0,005	0,023		
01/03/02	4,1	1652,88	0,002	0,006		
28/02/02	4,09	1642,58	0,012	-0,002		
27/02/02	4,04	1645,17	0,007	0,010		
26/02/02	4,01	1628,99	0,002	0,008		
25/02/02	4	1615,35	0,023	0,007		
22/02/02	3,91	1604,2	0,008	-0,009		
21/02/02	3,88	1619,08	0,024	0,007		
20/02/02	3,79	1607,03	0,003	-0,009		
19/02/02	3,78	1621,88	0,008	-0,009		
18/02/02	3,75	1637,38	0,000	-0,011		
15/02/02	3,75	1655,46	0,033	0,002		
14/02/02	3,63	1652,13	0,037	0,015		
13/02/02	3,5	1627,26	0,003	0,013		
12/02/02	3,49	1606,61	0,000	0,011		
11/02/02	3,49	1589,05	0,003	0,014		
08/02/02	3,48	1566,61	0,003	-0,010		
07/02/02	3,47	1582,4	0,012	0,007		
06/02/02	3,43	1571,05	-0,014	-0,014		
05/02/02	3,48	1593,01	0,009	-0,014		
04/02/02	3,45	1615,47	0,003	-0,002		
01/02/02	3,44	1618,27	0,009	0,017		
31/01/02	3,41	1591,13	0,000	0,011		
30/01/02	3,41	1574,08	0,006	-0,021		
29/01/02	3,39	1608,48	-0,003	0,003		
28/01/02	3,4	1603,66	0,009	0,005		
25/01/02	3,37	1596,16	-0,003	-0,002		
24/01/02	3,38	1599,9	0,012	0,021		
23/01/02	3,34	1566,33	0,003	-0,007		
22/01/02	3,33	1576,69	-0,006	0,007		
21/01/02	3,35	1565,17	-0,015	-0,017		
18/01/02	3,4	1592,28	0,006	0,003		
17/01/02	3,38	1587,63	0,000	0,002		
15/01/02	3,38	1584,92	-0,020	-0,008		
14/01/02	3,45	1598,18	0,000	-0,030		
11/01/02	3,45	1648,14	0,006	0,009		
10/01/02	3,43	1633,72	-0,009	-0,013		
09/01/02	3,46	1656,06	0,000	-0,006		
08/01/02	3,46	1665,47	0,021	-0,018		
07/01/02	3,39	1695,88	0,003	0,010		
04/01/02	3,38	1678,28	-0,003	0,016		
03/01/02	3,39	1651,73	0,003	0,030		
02/01/02	3,38	1603,27	0,000	0,001		
28/12/01	3,38	1600,99	0,000	0,014		
27/12/01	3,38	1578,65	0,063	0,009		
21/12/01	3,18	1564,05	0,006	0,008		
20/12/01	3,16	1551,35	-0,006	-0,010		
19/12/01	3,18	1567,12	-0,022	-0,012		
18/12/01	3,25	1586,81	-0,009	0,016		
17/12/01	3,28	1561,64	-0,006	0,006		
14/12/01	3,3	1552,7	0,000	-0,004		
13/12/01	3,3	1559,53	-0,003	-0,017		
12/12/01	3,31	1586,35	0,009	-0,011		
11/12/01	3,28	1604,28	0,048	0,009		
10/12/01	3,13	1589,24	-0,009	-0,016		
07/12/01	3,16	1614,61	-0,022	0,012		
05/12/01	3,23	1594,85	0,009	0,030		
04/12/01	3,2	1549,08	0,003	0,004		
03/12/01	3,19	1542,83	0,000	-0,011		
30/11/01	3,19	1559,67	0,003	0,012		
29/11/01	3,18	1540,48	-0,015	-0,008		
28/11/01	3,23	1553,05	0,009	-0,008		
27/11/01	3,2	1565,16	0,016	-0,019		
26/11/01	3,15	1596,2	-0,003	0,007		
23/11/01	3,16	1585,84	0,010	-0,001		
22/11/01	3,13	1586,83	-0,037	0,021		
21/11/01	3,25	1553,76	0,022	-0,004		
20/11/01	3,18	1559,65	0,013	-0,012		
19/11/01	3,14	1579,19	0,047	-0,003		
16/11/01	3	1584,02	-0,048	0,006		
15/11/01	3,15	1575,13	0,000	0,010		
14/11/01	3,15	1560,16	0,006	0,010		
13/11/01	3,13	1545,38	0,043	0,031		
12/11/01	3	1498,37	0,000	-0,007		
09/11/01	3	1508,24	0,000	-0,018		
08/11/01	3	1535,29	0,017	0,030		
07/11/01	2,95	1490	-0,017	0,003		
06/11/01	3	1485,18	0,042	0,001		
05/11/01	2,88	1484,41	0,000	0,021		
02/11/01	2,88	1454,17	0,000	0,011		
01/11/01	2,88	1438,81	0,000	-0,021		
31/10/01	2,88	1469,02	0,000	0,040		
30/10/01	2,88	1412,64	-0,040	-0,035		
29/10/01	3	1464,05	0,017	-0,005		
25/10/01	2,95	1471,59	0,000	-0,015		
24/10/01	2,95	1493,66	0,003	0,033		
23/10/01	2,94	1446,22	-0,020	0,041		
19/10/01	3	1389,18	-0,010	-0,017		
17/10/01	3,03	1413,26	0,027	0,024		
16/10/01	2,95	1380,15	0,061	0,009		
15/10/01	2,78	1367,76	-0,089	-0,024		
12/10/01	3,05	1401,83	0,017	-0,005		
11/10/01	3	1408,56	0,020	0,042		
10/10/01	2,94	1352,41	0,058	0,013		
09/10/01	2,78	1335,37	0,011	0,020		
05/10/01	2,75	1309,53	-0,004	0,001		
04/10/01	2,76	1307,75	0,011	0,041		
02/10/01	2,73	1256,4	0,046	0,014		
01/10/01	2,61	1239,6	-0,071	-0,008		
28/09/01	2,81	1250,21	-0,007	0,024		
26/09/01	2,83	1221,36	0,029	-0,005		
25/09/01	2,75	1227,39	0,000	0,009		
24/09/01	2,75	1216,08	-0,018	0,020		
21/09/01	2,8	1192,22	-0,004	-0,019		
20/09/01	2,81	1215,25	-0,024	-0,034		
19/09/01	2,88	1258,41	0,000	0,008		
18/09/01	2,88	1248,21	-0,034	-0,013		
14/09/01	2,98	1264,62	0,000	-0,029		
13/09/01	2,98	1302,78	0,000	0,007		
12/09/01	2,98	1293,97	-0,007	0,026		
11/09/01	3	1261,29	-0,042	-0,064		
07/09/01	3,13	1348,21	0,000	-0,018		
06/09/01	3,13	1372,45	0,010	-0,017		
05/09/01	3,1	1395,79	-0,010	0,005		
03/09/01	3,13	1388,83				

Appendix 12:Beta Calculation of YIT

Stocks Prices (Adjusted Close)				% Returns			Stock Beta	
Date	MMO	OMXH25		MMO	OMXH25		MMO Beta	0,261289979
29/04/02	2,9	1584,58		0,010	-0,002			
26/04/02	2,87	1587,38		0,025	-0,009			
23/04/02	2,8	1602,39		0,000	-0,011			
22/04/02	2,8	1620,37		0,000	-0,014			
19/04/02	2,8	1643,51		-0,031	-0,027			
17/04/02	2,89	1689,08		0,007	0,007			
16/04/02	2,87	1676,58		0,000	0,019			
11/04/02	2,87	1644,83		0,025	-0,012			
10/04/02	2,8	1664,94		0,007	-0,003			
09/04/02	2,78	1669,37		0,000	0,004			
08/04/02	2,78	1662,36		-0,018	-0,010			
05/04/02	2,83	1678,57		-0,024	-0,005			
03/04/02	2,9	1687,42		0,025	0,002			
02/04/02	2,83	1683,77		-0,014	0,003			
27/03/02	2,87	1678,08		-0,003	0,001			
26/03/02	2,88	1676,04		-0,003	-0,006			
25/03/02	2,89	1685,39		-0,003	-0,001			
22/03/02	2,9	1686,32		0,010	0,001			
21/03/02	2,87	1684,63		-0,010	0,007			
20/03/02	2,9	1672,35		0,028	-0,007			
19/03/02	2,82	1684,84		0,014	-0,006			
18/03/02	2,78	1695,08		-0,018	0,009			
15/03/02	2,83	1679,13		0,000	-0,005			
14/03/02	2,83	1686,89		-0,031	-0,009			
13/03/02	2,92	1702,53		-0,064	0,001			
12/03/02	3,12	1700,71		-0,055	-0,012			
11/03/02	3,3	1721,15		0,041	-0,003			
08/03/02	3,17	1726,67		-0,019	0,008			
07/03/02	3,23	1713,79		0,000	0,014			
05/03/02	3,23	1690,46		0,025	0,000			
04/03/02	3,15	1690,53		0,010	0,023			
01/03/02	3,12	1652,88		0,016	0,006			
28/02/02	3,07	1642,58		-0,028	-0,002			
27/02/02	3,16	1645,17		0,003	0,010			
26/02/02	3,15	1628,99		0,016	0,008			
25/02/02	3,1	1615,35		-0,006	0,007			
22/02/02	3,12	1604,2		0,016	-0,002			
20/02/02	3,07	1607,03		-0,032	-0,009			
19/02/02	3,17	1621,88		0,000	-0,009			
18/02/02	3,17	1637,38		0,013	-0,011			
15/02/02	3,13	1655,46		0,020	0,002			
14/02/02	3,07	1652,13		-0,010	0,015			
13/02/02	3,1	1627,26		0,010	0,013			
12/02/02	3,07	1606,61		0,000	0,011			
11/02/02	3,07	1589,05		0,000	0,014			
08/02/02	3,07	1566,61		0,017	-0,010			
07/02/02	3,02	1582,4		0,000	0,007			
06/02/02	3,02	1571,05		0,000	-0,014			
05/02/02	3,02	1593,01		-0,023	-0,014			
04/02/02	3,09	1615,47		0,007	-0,002			
01/02/02	3,07	1618,27		0,007	0,017			
31/01/02	3,05	1591,13		0,027	0,011			
30/01/02	2,97	1574,08		0,000	-0,021			
29/01/02	2,97	1608,48		0,017	0,003			
28/01/02	2,92	1603,66		0,039	0,005			
25/01/02	2,81	1596,16		0,007	-0,002			
24/01/02	2,79	1599,9		0,022	0,021			
23/01/02	2,73	1566,33		0,011	-0,007			
22/01/02	2,7	1576,69		-0,025	0,007			
21/01/02	2,77	1565,17		0,026	-0,017			
18/01/02	2,7	1592,28		0,015	0,003			
17/01/02	2,66	1587,63		-0,004	0,019			
16/01/02	2,67	1558,67		0,008	-0,017			
15/01/02	2,65	1584,92		0,019	-0,008			
14/01/02	2,6	1598,18		-0,019	-0,030			
11/01/02	2,65	1648,14		0,000	0,009			
10/01/02	2,65	1633,72		0,011	-0,013			
09/01/02	2,62	1656,06		0,016	-0,006			
08/01/02	2,58	1665,47		-0,034	-0,018			
07/01/02	2,67	1695,88		0,027	0,010			
04/01/02	2,6	1678,28		0,032	0,016			
03/01/02	2,52	1651,73		0,016	0,030			
02/01/02	2,48	1603,27		0,025	0,001			
28/12/01	2,42	1600,99		-0,004	0,014			
27/12/01	2,43	1578,65		0,013	0,009			
21/12/01	2,4	1564,05		0,013	0,008			
20/12/01	2,37	1551,35		0,013	-0,010			
19/12/01	2,34	1567,12		-0,025	-0,012			
18/12/01	2,4	1586,81		0,021	0,016			
17/12/01	2,35	1561,64		0,009	0,001			
13/12/01	2,33	1559,53		-0,029	-0,017			
12/12/01	2,4	1586,35		0,013	-0,011			
11/12/01	2,37	1604,28		-0,012	0,009			
10/12/01	2,4	1589,24		0,000	-0,016			
07/12/01	2,4	1614,61		0,008	0,012			
05/12/01	2,38	1594,85		0,000	0,030			
04/12/01	2,38	1549,08		-0,012	0,004			
03/12/01	2,41	1542,83		-0,008	-0,011			
30/11/01	2,43	1559,67		0,066	0,012			
29/11/01	2,28	1540,48		-0,021	-0,008			
28/11/01	2,33	1553,05		0,022	-0,008			
27/11/01	2,28	1565,16		-0,009	-0,019			
26/11/01	2,3	1596,2		0,036	0,007			
23/11/01	2,22	1585,84		0,023	-0,001			
22/11/01	2,17	1586,83		0,024	0,021			
21/11/01	2,12	1553,76		0,000	-0,004			
20/11/01	2,12	1559,65		-0,036	-0,012			
19/11/01	2,2	1579,19		0,089	-0,003			
16/11/01	2,02	1584,02		0,000	0,006			
15/11/01	2,02	1575,13		0,010	0,010			
14/11/01	2	1560,16		0,000	0,010			
13/11/01	2	1545,38		0,020	0,031			
12/11/01	1,96	1498,37		-0,005	-0,007			
09/11/01	1,97	1508,24		0,010	-0,018			
08/11/01	1,95	1535,29		-0,035	0,030			
07/11/01	2,02	1490		0,047	0,003			
06/11/01	1,93	1485,18		0,000	0,001			
05/11/01	1,93	1484,41		0,060	0,032			
01/11/01	1,82	1438,81		0,000	-0,021			
31/10/01	1,82	1469,02		0,000	0,003			
29/10/01	1,82	1464,05		-0,005	-0,011			
26/10/01	1,83	1479,83		0,028	0,023			
23/10/01	1,78	1446,22		-0,033	0,040			
22/10/01	1,84	1391,16		0,011	0,008			
16/10/01	1,82	1380,15		0,000	-0,015			
12/10/01	1,82	1401,83		0,011	0,037			
10/10/01	1,8	1352,41		0,000	0,013			
09/10/01	1,8	1335,37		-0,016	0,012			
08/10/01	1,83	1319,36		0,000	0,058			
03/10/01	1,83	1246,6		0,022	-0,008			
02/10/01	1,79	1256,4		-0,006	0,014			
01/10/01	1,8	1239,6		0,000	0,040			
21/09/01	1,8	1192,22		0,029	-0,053			
19/09/01	1,75	1258,41		-0,064	-0,005			
14/09/01	1,87	1264,62		0,022	0,003			
11/09/01	1,83	1261,29		-0,047	-0,064			
07/09/01	1,92	1348,21		-0,010	-0,018			
06/09/01	1,94	1372,45		0,021	-0,012			
03/09/01	1,9	1388,83		#REF!	#REF!			

Appendix 13: Beta Calculation of Marimekko