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A search for abnormal returns in the Swedish equity market during 2002-2012

– A two-fold application of the residual income valuation framework

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Abstract

This study investigates the ability to generate abnormal returns using only historical accounting information in the Swedish equity market during 2002-2012. We have used the residual income valuation framework in two approaches to predict price-to-book ratios. First, a direct approach where each company is valued individually. Second, a relative approach using a cross-sectional regression. We have solely used historical information in both models. Two equally-weighted portfolios are formed based on the predictions of the direct and relative approaches. Predictions are conducted in March every year 2002-2011, and trading positions were thereafter held during a 12 month period. None of the approaches generated any significant abnormal returns after adjusting for CAPM and the Fama-French 3-factor model. Our results support the notion that historical accounting information is currently taken into account in stock prices in Sweden. The results are aligned with similar findings from Skogsvik (2008) and Skogsvik and Skogsvik (2010). Finally our study finds that historical accounting information is a good but not sufficient indicator of future performance, hence forward looking information as a complement is needed in a search for abnormal returns.

Keywords: Abnormal returns, residual income valuation, price-to-book ratio, accounting information, stock price prediction

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1 Introduction

"If past history was all that is needed to play the game of money, the richest people would be librarians" –Warren Buffet

The efficient-market hypothesis asserts that the stock market is efficient in terms of incorporating all publicly available information in stock prices (Fama, 1970). The purpose of this study is to investigate this claim with respect to the Swedish stock market during 2002-2012. We use two prediction models based on historical accounting information, construct investment portfolios based on their predictions and evaluate the performance of these portfolios.

In the 1980s, the prevailing view was that the stock market is efficient and that available accounting information was reflected in stock prices. This view was challenged by Ou and Penman in 1989 who were able to achieve excess returns using a model based solely on historical accounting information. For some decades now the efficient-market hypothesis has been the subject of an on-going debate on asset pricing within the realms of finance. Several studies that have followed Ou and Penman (1989) also point to evidence of market inefficiency and instances of market mispricing (Fama and French, 1993; Bernard, 1994; Setino and Strong, 1998; Skogsvik, 2008).

The relation between accounting information and stock prices have been investigated from other perspectives as well. The notion of "value stocks" and "growth stocks" and the corresponding book-to-market ratio was brought to attention by Fama and French (1992) as highly relevant for stock returns. While Fama and French attribute the abnormal returns that can be achieved by investing using the book-to-market ratio to an unidentified risk factor, other researchers attribute it to systematic mispricing.

When accounting scholars (Wilcox, 1987; Penman, 1991; Penman, 1996) investigated the underlying components of the book-to-market ratio, they found a clear direct relation between the book-to-market ratio (or equivalently the price-to-book ratio or P/B) and the accounting ratio return on equity (ROE). This relationship can be explained by the residual income valuation model (RIV) elaborated by Feltham Ohlsson (1995). Penman and Sougiannis (1998) have found that the RIV model have fewer forecast errors than alternative models, hence valuation using the RIV model should generate a more precise result. This recommendation has resulted in several applications of the RIV framework that further assert instances of market mispricing (Frank and Lee (1998); Skogsvik and Skogsvik, 2010).

Most of the previous research studying the ability of historical accounting information to predict stock prices are either performed on time periods prior to 2003 or have included non-historical information in the prediction model. Others who have observed the strong relationship between historical ROE and P/B have yet to test this relationship in a trading strategy. We thus find it interesting to perform a study on recent data on the Swedish stock market based on the theoretic foundations of the RIV model. The purpose of this study is to investigate the following research question:

Can we use publicly available historical accounting information to predict stock prices and generate abnormal returns on the Swedish stock market in recent time?

More specifically: We apply the framework of the residual income valuation model using only historical accounting information and study its predictive ability in two ways:

- We apply the residual income valuation model on stocks in a uniform way using historical accounting information, to directly predict price-to-book.

- We apply a cross-sectional regression analysis to investigate how the fundamental factors of the residual income valuation model are priced in the market and make relative price-to-book predictions.

Our study differs from previous studies since we solely use historical accounting information. Our sample period is up to date using data from the last ten year period (2002-2012). Our contribution to previous literature is two-fold: We conduct our study on a recent time period, and we restrict our model to only include historical information. Additionally we conduct a relative trading strategy based on the cross-sectional relationship between price-to-book and historical residual income and compare the results to the direct RIV-valuation model.

The remainder of this thesis is structured in the following way: In section 2, we provide an overview of previous research as well as descriptions of key theoretical concepts. In section 3, we describe our method, how we handle data and how we make our predictions and evaluate performance. In section 4, we present our results and provide analysis. In section 5 we discuss key findings and state our conclusions.

2 Previous research

We find three major streams of research that are relevant to our study. The first stream is the most important one and is central to our research question. It provides an overview of previous efforts to investigate the relationship between accounting information and stock prices as well as some attempts to use historical information in a prediction setting. The second stream provides the theoretical background on the residual income valuation model and results of previous application using the RIV framework. The third stream examines the most relevant studies on the cross-sectional relationship between the price-to-book ratio and return on equity.

2.1 The relationship between accounting information and stock prices

This line of research starts with Ball and Brown (1968) who showed that there actually exists a relationship between accounting information and stock prices, which is a fundamental prerequisite for further studies. They showed that earnings announcements trigger the market to revise its expectations of future performance and adjust share prices accordingly, which means that an investor with foresight of future earnings will be able to achieve significant returns.

In the 1980s, the prevailing and generally accepted view in the finance community was that the stock market is semi-strong form efficient and thus incorporates all publicly available information including accounting information in the pricing of stocks (Setiono and Strong, 1998). Some of the first to challenge that view were Ou and Penman (1989). Using only historical accounting information, they formed an investment strategy during 1973-1983 and were able to generate abnormal returns. The strategy was based on predictions of earnings changes of individual companies based on accounting information readily available in their financial statements. They used a large set of measures, such as liquidity, asset turnover, profitability and leverage. The measures were selected based purely on their predictive ability (i.e. derived from statistical models), and not based on any theoretical framework. The measures were combined into a summary variable and indicated the probability for an earnings increase. The ability of Ou and Penman (1989) to generate abnormal returns using only accounting information questioned the efficiency of the stock market.

This spurred further research and similar studies followed. Setiono and Strong (1998) conducted a similar study on UK data and were able to confirm the results of Ou and Penman (1989). The conclusion from these studies taken together is that the stock market does not fully take into account historical accounting information.

Skogsvik (2008) investigates if accounting information can be used to predict changes in return on equity and evaluates the performance of trading strategies based on such predictions during 1970-1994. To predict ROE, Skogsvik (2008) tests two models: One that comprise both a measure of a large set of accounting information (similar to Ou and Penman, 1989) and historical ROE, and one that use only historical ROE. Skogsvik (2008) finds that a model based only on historical ROE actually can predict future ROE with higher accuracy than more elaborate models that include large sets of accounting information. The trading strategy based on predicted ROE could generate a three-year return of 29% to the hedge portfolio. The conclusion is that historical ROE is the best predictor of future changes in ROE and that the stock market does not fully take into account the information content of historical ROE. However the author indicated the diminishing significance of abnormal returns over time and hence asserted that the markets have become more efficient over time.

In a subsequent study, Skogsvik and Skogsvik (2010) applied a similar prediction of mid-term ROE ratios using historical ROE. However in their operationalization, they applied the residual income valuation model to measure whether or not the implied market expected ROE was higher or lower than the predicted ROE. If the predicted ROE based on accounting information was higher than the market implied ROE, then the authors went long in those stocks and vice versa. This investment strategy generated an average monthly excess return on the hedge position of up to 0.8% during the period 1983-2003. Similar to Skogsvik (2008) the excess return seemed to diminish during the last holding period 1995-2003 indicating a less evident market mispricing over time.

Table 2.1 Main findings: The relationship between accounting information and stock prices

Study	Data	Return
Ou and Penman (1989)	US 1973-1983	13% two-year hedge position
Setiono and Strong (1998)	UK 1971-1988	11% one-year hedge position
Skogsvik (2008)	Sweden 1970-1994	29% three-year hedge position
Skogsvik and Skogsvik (2010)	Sweden 1970-2003	0.8% monthly excess return hedge position

The studies within this stream of research show a strong link between historical accounting information and stock prices, and they provide indications that predictions based on historical accounting information could be exploited to generate abnormal returns. However, the findings by Ou and Penman (1989) are purely based on statistical analysis, which means that there is no theoretical framework to support the results. Therefore we receive no guidance on what parts of the historical accounting information that are the most relevant for predicting stock prices. To some extent, we find guidance on this matter from more recent studies such as Skogvik (2008) and Skogsvik and Skogsvik (2010). Both studies point to ROE as the historical accounting ratio with the best predictive ability. In the following sections we will relate ROE to the price-to-book ratio and the residual income valuation framework.

2.2 The residual income valuation model

The development of the residual income valuation model (RIV) can be attributed to several researchers. An early investigation into a model of this kind was performed by Edwards and Bell (1961). The model was later developed by Ohlson (1990, 1995) and Feltham and Ohlson (1995) and it is sometimes referred to as the Edwards-Bell-Ohlson model (EBO). We will touch upon the mechanics of this model but an explanation in detail is outside the scope of this study, and we recommend Skogsvik, K (2002) for a hands-on tutorial. In the following we will demonstrate the basic properties of the model. The RIV model is derived from the dividend discount model, where the value of equity is obtained as the present value of future expected net dividends. Net dividends correspond to dividends less any capital contributions from owners. The dividend discount model:

$$V_t = \sum_{i=1}^{\infty} \frac{E_t[D_{t+i}]}{(1+\rho_e)^i} \qquad 2.1$$

Where V_t denotes the capital value of equity at time t, $E_t[.]$ is the expectation operator based on available information at time t, D_{t+i} is the net dividend at time $t+i$, and ρ_e is the required rate of return on equity. Starting from this basic version, Ohlson (1995) and Feltham and Ohlson (1995) reformulates the model assuming a clean surplus relation (that the net dividend equals the difference between the net income during the period and the increase in book value of equity). They show that Equation 2.1 can be rewritten as:

$$V_t = B_t + \sum_{i=1}^{\infty} \frac{E[NI_{t+i} - (\rho_e \times B_{t+i-1})]}{(1+\rho_e)^t} \qquad 2.2$$

$$V_t = B_t + \sum_{i=1}^{\infty} \frac{E[(ROE_{t+i} - \rho_e) \times B_{t+i-1}]}{(1+\rho_e)^i} \qquad 2.3$$

Where B_t denotes the book value of equity at time t, B_{t+i-1} is the book value of equity, NI_{t+i} is the net income and ROE_{t+i} is the return on equity at time $t+i$. Return on equity is defined as:

$$ROE_{t+i} = \frac{NI_{t+i}}{B_{t+i-1}} \qquad 2.4$$

Finally, by adding a terminal value we obtain the residual income valuation model:

$$V_t = B_t + \sum_{i=1}^{T} \frac{E[(ROE_{t+i} - \rho_e) \times B_{t+i-1}]}{(1+\rho_e)^i} + \frac{B_T(V_T/B_T - 1)}{(1+\rho_e)^i} \qquad 2.5$$

Where B_T is the book value of equity and V_T is the capital value of equity at the horizon point in time T. The key factor in the model is $(ROE - \rho_e)$, defined as residual income or RI. This measure reflects the ability of a company to generate return on equity ROE above the required rate of return on equity ρ_e. Therefore if a firm can generate future excess returns then the capital value of the owners' equity B_t should be valued above its historical book value B_t. On the contrary firms that "destroy value" (i.e. generating future return on equity below the required rate of return on equity), then the capital value of owner's equity B_t should be valued below its book value equity.

The expression $B_T(V_T/B_T - 1)$ or equivalently $V_T - B_T$ is the value of equity at the horizon point in time (the terminal value) in excess of the book value of equity. At this point the company is assumed to be in a steady state where the business goodwill (i.e. the company's ability to generate excess return on equity above the required rate of return on equity) diminishes due to competition and the company will only be able to generate the required rate of return on equity. Any difference between the value of equity and the book value of equity is explained by the accounting measurement bias. The accounting measurement bias is a result of discrepancies between the intrinsic value of assets and the accounting value of assets. In an accounting regime where the intrinsic value and accounting value coincides, then $V_T - B_T = 0$. On the other hand, in a conservative accounting regime where the accounting values are below or equal to the intrinsic values, then $V_T - B_T > 0$. This difference is called the permanent measurement bias (PMB). The RIV model using the PMB can be restated as:

$$V_t = B_t + \sum_{i=1}^{T} \frac{E[(ROE_{t+i} - \rho_e) \times B_{t+i-1}]}{(1+\rho_e)^i} + \frac{B_T \times PMB}{(1+\rho_e)^i} \qquad 2.6$$

Based on a set of estimation methods the PMB can be calculated individually for each firm. Runsten (1998) studied the differences in PMB across industries and have provided us with an estimate of the

PMB in each sector. An overview of industries and corresponding PMB can be found in Appendix 7.2. To conclude, the application of the RIV model hinges on the ability to predict residual income and growth in book value equity in future periods prior to the terminal value.

Following the theoretical developments of the residual income valuation model by Ohlson (1990; 1995) and Feltham and Ohlson (1995), several empirical studies ensued. The following studies display examples of the applicability of the RIV model as well as the ability of the RIV model to make predictions that can be used in trading strategies.

Penman and Sougiannis (1998) compare the residual income valuation model with other approaches such as forecasting dividends or cash flows. The techniques are evaluated based on their ability to predict stock prices. They find that the RIV model have fewer forecast errors than alternatives. It seems that accrual accounting, through anticipating investments and recognition of non-cash value changes, is more practical for valuation in most settings. For our study, we believe that this confirms our choice of prediction model. Finally, Penman and Sougiannis (1998) also examine cases where this approach does not perform well, and it turns out the these are companies with high price-to-earnings or high price-to-book.

Another significant study within this field is Frankel and Lee (1998). They test the predictive ability of the residual income valuation model empirically. To obtain forecasts of return on equity, they use analyst consensus forecasts in their RIV model. The value obtained from the RIV model was set in relationship to the observed price. Long positions were taken in the quintile with the highest value-to-price ratio (V/P) and short positions in the quintile with the lowest ratio. This trading strategy resulted in a three-year return on the hedge position of 35%. The result showed that superior returns could be generated by using analyst consensus forecasts through an application of the RIV model. This indicates a possible modeling mispricing embedded in the market.

The Frankel and Lee (1998) study received significant attention and further studies such as Trombley Hwang and Ali (2003) tested the V/P based portfolio strategy and controlled the returns for an extensive set of risk factors. The study concludes that although the V/P is significantly related to some risk proxies, the V/P ratio continues to exhibit a significant positive return. Hence the study further strengthens the evidence on mispricing identified in the V/P ratio.

Table 2.2 Main findings: The residual income valuation model

Returns are return on hedge positions. Frankel, Charles Lee's (1998) V/P strategy went long in portfolios with highest quintiles V/P and short in V/P within the lowest quintiles. Positions are held for 36 month. Skogsvik & Skogsvik (2010) positions are held for 36 month.

Study	Data	Findings
Frankel, Charles, Lee (1998)	US 1976-1993	V/P -strategy implemented by RIV generated a 35% return
Penman and Sougiannis (1998)	US 1973-1990	RIV model exhibits fewer forecasting errors
Trombley Hwang, Ali (2003)	US 1968-1985	V/P generates significant abnormal returns after controlling for 12 known risk factors
Skogsvik and Skogsvik (2010)	Sweden 1970-2003	0.8% monthly excess return

There are several important arguments for applying the RIV model. First, the residual income valuation model seems to have fewer forecasting errors than alternatives such as forecasting dividends or cash flows. In addition, the RIV model can be easily rewritten to reflect the price to book ratio. Starting from Equation 2.6 and dividing all terms by the book value of equity, we obtain:

$$\frac{V_t}{B_t} = 1 + \sum_{i=1}^{T} \frac{E[(ROE_{t+i} - \rho_e) \times B_{t+i-1}]/B_t}{(1+\rho_e)^i} + \frac{B_T/B_t \times PMB}{(1+\rho_e)^i} \qquad 2.7$$

The expression above shows that for any observed price-to-book ratio, the market's implied expectation of residual income and growth in book value can be derived. Rewriting the RIV model as a price-to-book ratio also facilitates relative firm valuations. Holding all other factors the same between the target firm and its peer, the only differences in valuation should be attributed to the differences in residual income and growth in book value of equity. In conclusion, we find that the RIV model seems to be practical and suitable for making predictions on a broad sample for the purpose of our study.

2.3 The relation between price-to-book and return on equity

The rewritten RIV model in Equation 2.7 shows the fundamental components of the observed price to book ratio. Given the derivation of the RIV model, we can see that the P/B ratio is a function of expected ROE. Previous studies have investigated the cross-sectional relationship between the price-to-book ratio and return on equity, and the following is an overview of the key findings from some of the most influencing papers identified within this field.

Key definitions	
Historical ROE	The ROE observed through historical accounting information
Expected ROE	The ROE that is expected in future periods
Future ROE	The actual ROE realized in future periods

Already in the late 1980s, Wilcox (1987) found a strong cross-sectional relationship between historical ROE and the P/B ratio. A cross-sectional regression performed across 949 stocks using historical ROE as the explanatory variable resulted in a strong observed linear relationship between historical ROE and P/B. After replicating the same regression across industries, the author found the relationship to be robust but found varying intercepts across industries. The study confirmed the relationship implied by the RIV model, and Wilcox (1987) concluded that P/B ratio is a function of the expected ROE. Finally Wilcox (1987) asserts that the ROE-P/B relationship could be further improved by adjusting for industry effects and by adding forward looking information.

Penman (1996) investigated how the historical ROE relates to the pricing of stocks. Starting from the RIV model, the author states that the P/B ratio is a function determined by future ROE. However, when investigating the P/B-ROE relationship, the author found a strong correlation between *historical* ROE and observed P/B. The result is therefore contradictory to the notion that P/B is only a function of expected ROE and not a function of historical ROE. Penman further assert that in theory historical ROE should not be relevant in determining the P/B, but if historical ROE is serial correlated with future ROE (i.e. historical ROE will inform about future ROE) then historical ROE has the ability to determine P/B. However, Penman finds that although historical ROE provides some information about future ROE, in general it does not provide sufficient information of future ROE.

Skogsvik and Skogsvik (2008) investigate the validity of the price-earnings (P/E) ratio when used as a benchmark multiple in relative valuation. They investigated differences between the peer company and the target company with regards to return on equity and growth in equity. They show that P/E valuation is not able to handle those differences. Hence the authors recommend P/B ratio should be preferred as an relative valuation metric as to the traditional P/E ratio. Furthermore, when applying a relative valuation comparing a target company to the P/B and ROE of a peer group, the authors recommend to state the price-to-book ratio as a linear function of the expected next year's ROE.

To conclude, previous studies have found a clear relationship between historical ROE and P/B. The studies assert that P/B is a function of expected ROE, hence cross-sectional differences in P/B implies differences in expected ROE. Furthermore the studies show that historical ROE is serial correlated to future ROE, hence historical ROE could be used as a proxy for future ROE. Therefore as long as historical ROE is a good empirical proxy for future ROE, then the cross-sectional difference in P/B can be explained by differences in historical ROE.

None of the studies above attempted to form a trading strategy based on the cross-sectional relationship of P/B and historical ROE. But both Penman (1996) and Wilcox (1987) infers that investors could benefit from predicting a more precise future ROE. Hence potential mispricing could occur if the market fails to fully take into account the information content in the historical ROE. Bernard (1994) finds that to a certain extent prices today fails to fully respond to the information content of historical ROE. Therefore, Bernard (1994) states that it could be an indication of potential mispricing when the historical ROE and the observed P/B of individual stocks are inconsistent.

Table 2.3 Main findings: The relation between price-to-book and return on equity

Study	**Data**	**Findings**
Wilcox (1987)	US 1976-1980	Strong cross-sectional relationship found between historical ROE and P/B.
Bernard (1994)	US 1974-1991	Historical ROE is a better predictor of future ROE than observed P/B. Potential mispricing could occur for individual stocks.
Penman (1996)	US 1968-1985	Historical ROE is serial correlated with future ROE. Therefore strong relationship between P/B and historical ROE.
Skogsvik and Skogsvik (2008)	Conceptual study	P/B is a preferred benchmark ratio for relative valuation compared to P/E.

The studies mentioned above support the notion that cross-sectional differences in P/B are based on differences in expected ROE. Given the RIV model this should be the case (i.e. firms with the ability to generate high excess return should be traded at a higher P/B multiple).

However, when applying the RIV framework in a cross-sectional study, additional factors in the model should be taken into account, such as the required rate of return on equity and the growth in book value of equity. Given the support for the relationship between historical ROE and P/B, a cross-sectional regression model based on the linkage between residual income, growth in book value of equity and P/B should yield a similar if not an even more refined relationship. The studies above also indicate that cross-sectional mispricing could occur if the market fails to incorporate the information content of historical ROE in certain stocks. This motivates our effort to explore a trading strategy based on the cross-sectional relationship between residual income and P/B.

3 Method

3.1 Introduction

To reiterate, the purpose of this study is to predict stock prices using historical accounting information, and subsequently evaluate the performance of trading strategies based on those predictions. Based on the findings in previous research pointing to the advantages of the residual income valuation model both in terms of practicality and predictive ability, we believe that the RIV model is an appropriate starting point for our investigation.

To make our predictions, we use two models. One, we apply the residual income valuation model on each company using historical data as input to the model. This is an *direct* application of the model, where we examine each company by itself, taking into account historical accounting information. In addition to this direct application, we also attempt a cross-sectional approach. Previous studies such as Wilcox (1987) and Penman (1991) have found a strong cross-sectional relationship between the price-to-book ratio and return on equity. We aim to use this relationship by applying a cross-sectional regression model. This implies a *relative* approach, where we use the regression coefficients to make our predictions, so that the pricing of historical accounting information across all stocks are taken into account.

Both models are applied at the end of March every year 2002-2011. At this time of the year, all companies have released their fourth quarter report. We then take positions based on those predictions, and hold those positions until the end of March the following year. Consequently, we hold positions from end of March 2002 to end of March 2012.

However, first we will describe our data and how we handle data problems. Second, we will demonstrate in detail how we apply the models on our sample and how we obtain our predictions. Third, we will show how we design our trading strategies. Finally, we delineate our method for evaluating the performance of the trading strategies.

3.2 Data

3.2.1 Forming the dataset

We limit our study to the Swedish stock market. Previous research has mainly covered the US stock markets, and we have been unable to find any study that has conducted a similar investigation on Swedish data in a recent time period. To avoid the many issues associated with smaller companies, such as stocks with low liquidity, volatile earnings, frequent listings and delistings as well as frequent new equity issues, we leave out the smaller market places and focus on the companies listed on the main market place in Sweden: Nasdaq OMX Stockholm (henceforth referred to as OMXS).

At the end of 2011, 259 companies were listed on OMXS. All stocks except six stocks had a total number of trades over 1 000 during 2011, which indicates that the liquidity in general is not a problem.

Regarding the choice of time period, as previously mentioned the purpose is to investigate recent data. In this context, it means data no older than 15 years. Going back longer in time would not be helpful, since the stock market has evolved significantly over the past 15 years. Transactions costs have decreased substantially while transparency as well as accounting information quality has increased. Because of this, we believe that tests of a model on data more than 15 years old say very little about the model's performance today and over the coming years. This is an important part of our contribution to previous research.

However, we also need to avoid any issues with survivorship bias. This means that we are unable to base our investigation on only the companies that are listed on the OMXS today. This would imply that we historically would have had foresight of which companies that are surviving companies and only invest in those companies. Thus, we retrieve a full list of instruments listed on OMXS year by year from Datastream. We find consistent such lists for the period from 2002 to 2011. This implies a ten year sample period, and we believe that it is an adequate amount of time for drawing conclusions with general applications.

3.2.2 Data problems

We retrieve a list from Datastream of all instruments listed on OMXS in March every year from 2002 to 2012. These lists form the base for our model estimation each year. To begin with, we adjust the lists so that we have one equity instrument per company. For dual-listed companies we remove the share with the lowest market capitalization. Additionally, we remove non-equity instruments such as preference shares and closed-end funds.

Subsequently, we turn our attention to adjust the sample to improve homogeneity and achieve congruence with previous research. Year by year, we exclude companies based on a predetermined set of rules. We exclude companies with a primary listing outside of Sweden, since we want to avoid exchange rate effects due to differing reporting currencies. We remove companies that at some time during the estimation period have a negative book value of equity, since for a negative value we are unable to calculate the return on equity as well growth in equity. Furthermore, we remove companies with a fiscal year that does not correspond to the calendar year. Since we estimate our model in March every year, some of those companies would not yet have released their full-year reports, and others would have already released their first quarterly report. Furthermore, we naturally exclude those companies for which we are unable to find sufficient historical data. In our model estimation, we use accounting data spanning a period three years before the time of estimation, and stock price data going four years back. We exclude all companies where some historical information is missing.

Companies that carry out equity issues create additional data problems for us. Basically, the residual income valuation model incorporates equity issues without problems since it is the net dividend (that is, dividends less other owner transactions) that is forecasted. However, since we use historical data in our forecasts, equity issues represent a problem since the forecasting power of both return on equity and growth in book value of equity is affected by equity issues. First, equity issues, in contrast to dividends, are more often than not one-off items of large magnitude, whereas dividends tend to be stable and occur every year. This means that historical growth in book value of equity is representative of future growth in terms of dividends, since we expect dividends to continue at the same historical level. However is it uncommon to expect that equity issues will continuously be issued on the basis of its historical level. Therefore, in firms with recent equity issues historical growth in book value of equity is not a fair representation of future equity growth. Second, an equity issue in the year immediately prior to the point of model estimation, or in the first quarter of the same year, will diminish the forecasting power of return on equity. Return on equity is calculated based on equity values of the three preceding years. But it is uncertain if the company right away will be able to earn the same level of profitability on the newly issued equity as it did on the old equity. Thus, the forecasting power of return on equity is diminished. To avoid these problems, we remove companies that have issued equity any time during the last two years prior to the model estimation.

3.2.3 Industry selection

Our model hinges on the ability of historical performance to predict future performance. However, we believe that this is less true for some industries or sectors than others. Some sectors have a degree of "hit-or-miss" characteristics that might be less suitable for including in an estimation of this type. These companies typically spend considerable resources on research and development over some time period in search of the next income-generating project. During this time period earnings are low but will increase tremendously if the company succeeds in its efforts. This applies to companies active in exploration of oil and minerals, as well as companies working with biotechnology, pharmaceuticals, alternative energy, and computer software. This is supported by the findings of Penman and Sougiannis (1998) who conclude that the residual income valuation model does not perform well in these industries.

There are other problematic sectors as well. For investment companies and real-estate, the valuation is not driven primarily by operational earnings but instead by the development of the investment portfolio and in turn the net asset value.

Our industry selection approach can be compared with previous studies such as Skogsvik (2008) and Skogsvik and Skogsvik (2010) where only manufacturing companies are included. However, we believe that a broader approach in terms of industries is reasonable at the initial stage. Datastream classifies all companies according to the Industry Classification Benchmark (ICB) which we use to facilitate our industry selection. A complete list of ICB industries and if they are included in our sample can be found in Appendix 7.1.

3.2.4 Adjusting for outliers

Even after our careful adjustments for data problems as well as our industry selection, we still find that there are some companies in our sample that have a combination of price-to-book and return on equity that are far outside the rest of the sample. Although we have adjusted for come of "hit or miss" industries in our industry selection, still some firm with similar traits were identified in our gross data sample. To remedy this problem, we make adjustments for outliers.

In order to calculate the quartiles of our data sample we calculate a comparison statistic for each company. This statistic is based on its historical price-to-book ratio, its historical average residual income $\overline{RI_h}$ and historical growth in book value of equity $\overline{g_b}$. We assigned equal weights to each factor and calculated the comparable value in the following manner:

$$Comparison\ statistic = \frac{P_t/B_t}{10} - \overline{RI_h} - \overline{g_b} \tag{3.1}$$

According to the residual income valuation model as formulated in Equation 2.7, a high P/B ratio is a function of high residual income and high growth in equity book value. On the contrary, a company with an abnormally high P/B ratio but with negative residual income and negative growth in equity book value is inconsistent with the model. Hence, in accordance to this reasoning then the comparison statistic will assign a high value to companies with values inconsistent with the RIV model. Using this statistic we determine outliers.

The definitions for the outlier ranges are the following:

$$Upper\ end\ outliers: Q3 + 1.5 \times IQR \quad (3.2)$$

$$Lower\ end\ outliers: Q1 - 1.5 \times IQR \quad (3.3)$$

Where $Q1$ and $Q3$ are the first and third quartile respectively, and IQR is the interquartile range which is the distance between $Q1$ and $Q3$.Using this statistic, on average nine companies per year are classified as outliers. Table 3.1 and subsequent figures summarizes the outlier statistics year by year.

Table 3.1 Outlier statistics

Year	Outliers	Observations after excluding outliers
2002	8	71
2003	8	67
2004	4	79
2005	4	91
2006	13	80
2007	10	87
2008	12	78
2009	10	83
2010	8	74
2012	13	71
Total	90	781

Figure 3.1 Histogram of observations before outlier adjustments

The graph below shows the distribution of companies according to the comparison statistics prior to adjustments for outliers.

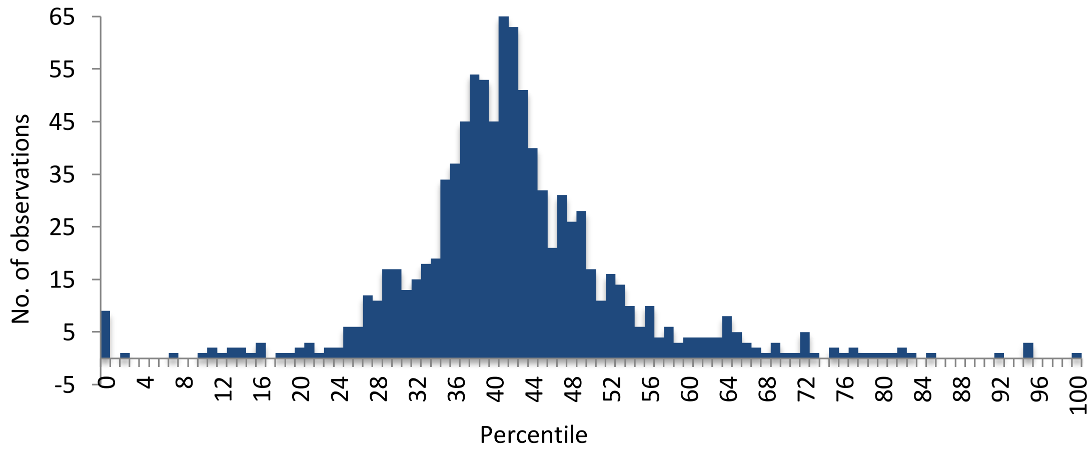
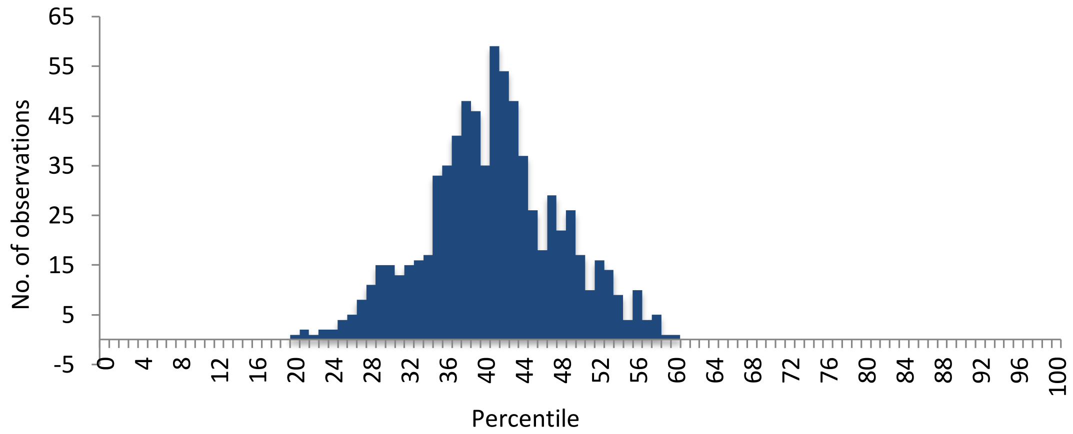


Figure 3.2 Histogram of observations after outlier adjustments

The graph below shows the distribution of companies according to the comparison statistics after the adjustments for outliers.



As displayed in Figure 3.1, in our gross data sample prior to the classifications of the outliers there existed a significant number of observations dispersed outside the concentration of our observations. In Figure 3.2, after controlling for outliers defined in Equation 3.2 and Equation 3.3 we can observe that a majority of the outliers scattered outside from the concentration within the 20^{th}-60^{th} percentiles were excluded. Outliers that we have identified all have characteristics inconsistent with the RIV model. In other words, outliers omitted from our main sample are firms with extreme high P/B along with negative or extremely low residual income and growth in book value of equity. Or extremely low P/B and high residual income and growth in book value of equity. A complete list of our final sample year by year can be found in Appendix 7.3.

3.3 Applying the models and making predictions

3.3.1 Direct predictions using the residual income valuation model

The residual income valuation model has previously been empirically tested by Frankel and Lee (1998). However, our approaches differ. Frankel and Lee (1998) have a forecast period of three years for return on equity and then let ROE grow into perpetuity. Additionally, analyst consensus estimates are used to forecast ROE. In our approach, we base our forecasts entirely on historical accounting information and then use the permanent measurement bias to obtain the steady state value. This is a key difference, since our valuation method does not rely on analyst estimates.

We apply the residual income valuation model to each company in our sample and predict the price-to-book multiple. To reiterate, we apply the model in March every year from 2002 to 2012, and make a prediction about the P/B ratio for the period until end of March the next year. The RIV model again:

$$\frac{V_t}{B_t} = 1 + \sum_{i=1}^{T} \frac{E[ROE_{t+i} - \rho_e \times B_{t+i-1}]/B_t}{(1+\rho_e)^i} + \frac{B_T/B_t \times PMB}{(1+\rho_e)^i} \qquad 3.4$$

The book value of equity at the time of valuation, B_t, is obtained from the company financial statements provided by Datastream. Since we are standing at the end of March at the time of estimation, we have the financial reports for the fourth quarter of the previous year available for all companies. Thus, we use the book value of equity at the end of the previous year as B_t.

In the forecast of future return on equity, we start with a forecast of the ROE at the end of the estimation year. Similar to Skogsvik (2008) we use the historical three-year average ROE to make our forecast. We calculate ROE based on openings values of book value of equity:

$$ROE_t = \frac{NI_t}{B_{t-1}} \quad 3.5$$

Where NI_t is the net income in year t. In our measure of income, we have not taken into account items in the comprehensive income statement. This is mainly because items recognized there are often of transitory nature. Those items are often associated with translation differences due to foreign exchange rates and other unrealized value changes in financial assets. We think net income is a better measure that captures company's persistent earnings. However, formally this is a violation of the clean surplus relation, which means that income less net dividends does not add up to the increase in book value of equity. However, we believe that it is more important to achieve a reliable measure of ROE that reflects long-term performance. As we will later explain, in the direct approach we base growth in book value of equity on historical dividend payout ratios, which means that the clean surplus relation holds true in our model.

The three-year average ROE is then:

$$\overline{ROE_h} = \frac{ROE_{t-1} + ROE_{t-2} + ROE_{t-3}}{3} \quad 3.6$$

During the time period t until T in steady state we expect the ROE for each companies to decline or increase linearly every year until it reaches its steady state level. To find this level, we back it out from the permanent measurement bias. Remember that in steady state, any residual income that the firm generates is exclusively an accounting measurement effect. This means that the steady state value of equity is equal to PMB times the book value of equity. In turn, this value is equal to the present value of future residual income:

$$B_T \times PMB = \frac{B_T(ROE_{ss} - \rho)}{\rho - g_{ss}} \quad 3.7$$

Where ROE_{ss} is the steady state return on equity and g_{SS} is the steady state growth rate. We assume that the steady state growth rate will be equal to a long-term inflation target of 2% which implies 0% real growth. Solving for ROE_{ss} we find:

$$ROE_{ss} = PMB \times (\rho - g_{ss}) + \rho \quad 3.8$$

Now that we have both ROE for the first year in the forecast period as well as the steady state ROE, we can interpolate linearly. The yearly change is then:

$$\Delta ROE_t = \frac{\overline{ROE_h} - ROE_{ss}}{T - t} \quad 3.9$$

To find the book value of equity each year in the forecast period, we simply apply the clean surplus relationship:

$$\Delta B_{t+i-1} = B_{t+i-2} \times (ROE_{t+i-1} - DS_{t+i-1}) \quad 3.10$$

Where DS_{t+i-1} is the dividend payout ratio in year $t + i - 1$. Similar to our approach for return on equity, the dividend payout ratio during the forecast period is assumed to gradually adjust to a steady state level. The dividend payout ratio in steady state is calculated as

$$DS_{ss} = 1 - \frac{g_{ss}}{ROE_{ss}} \quad 3.11$$

To forecast the dividend payout ratio of the year of estimation, we obtain dividend per share and earnings per share from Datastream and calculate the three-year historical average. From the year of estimation until steady state, we assume a gradual adjustment to the steady state level.

With return on equity and dividend payout ratio in place for every year in the forecasting period, we are able to find book value of equity. Rewriting the clean surplus relation:

$$\frac{B_{t+1} - B_t}{B_t} = \left(\frac{NI_t - DS_t}{B_t}\right) \quad 3.12$$

And thus, we obtain growth in book value of equity:

$$g_b = \left(ROE_t - \frac{DS_t}{B_t}\right) \quad 3.13$$

As the expression shows, the growth in book value of equity will change in accordance with the gradual adjustments of return on equity and dividend payout ratio as steady state approaches. To estimate the required return on equity ρ, we use the capital asset pricing model:

$$\rho = r_f + \beta(r_{mkt} - r_f) \quad 3.14$$

Where r_f is the risk-free rate, β is the stock beta, and $(r_{mkt} - r_f)$ is the market risk premium. To estimate the stock beta, we regress stock returns on the MSCI World index. This is a broad index with over 1 600 stocks from all developed markets in the world which we obtain from Datastream. Although our portfolio solely consists of companies listed in Sweden, we have used the MSCI World index as the market portfolio. This is because if we use the Swedish index we risk comparing to an index with a bias towards certain industrial sectors. After all, the Swedish index is not the market portfolio, and we believe that the MSCI World index is a better proxy for the market portfolio.

For this calculation we use weekly returns and four years of historical data. The risk-free rate and the market risk premium are heuristically estimated to 3% and 6% respectively. This may seem to be an assumption without justification. However, we have found that our results are robust with respect to this assumption, and are largely unchanged for all reasonable combinations of risk-free rate and market risk premium. We assume that ρ will remain unchanged over the entire forecast period.

With these factors in place, we are able to directly predict the price-to-book multiple of every company in our sample using the RIV formula in Equation 3.4. As previously mentioned, we do this in March every year from 2002 to 2011, and later we will use these P/B ratio predictions to form a trading strategy.

3.3.2 Relative predictions using the regression model

In addition to applying the RIV model directly across all companies in our sample, we also conduct a cross-sectional regression analysis and predict price-to-book through a relative approach. Previous research has found that there indeed exists a clear cross-sectional relationship between return on equity and price-to-book (Wilcox, 1987; Penman, 1996). Hence assuming this relationship holds true between return on equity and residual income, a relative prediction of future price-to-book using historical accounting information should yield similar results as the direct RIV model predictions.

The results of the relative prediction are then used to benchmark our results obtained in the direct RIV model and investigate whether or not the results from the two approaches differs.

To do this we must first transform the residual income valuation model into a linear form. Looking at the RIV model in Equation 3.4, we identify the key value drivers. The first key factor is residual income $RI = ROE - \rho$, and the second is growth in book value of equity g. Furthermore, we need to account for differences in the permanent measurement bias between companies in different sectors. Consequently, we define our dependent variable as the difference between PMB and actual price-to-book. This difference represents the expectation of future residual income that are not an effect of accounting measurement but instead excess profitability. This leads to the following initial specification:

$$P/B - PMB = \alpha + \beta_1 RI + \beta_2 g \tag{3.15}$$

We now proceed to specify the factors of our model in detail. Supported by the findings in previous research and in line with our research question, we use historical information to estimate the factors in our model.

To determine $RI = ROE - \rho$, we estimate return on equity as the three-year historical average. Both ROE and ρ is calculated similarly to the approach in section 3.3.1. Thus we find:

$$RI = \overline{ROE} - \rho \tag{3.16}$$

For consistency, we also use three years of historical information for estimating growth in equity book value g. We calculate the three-year geometric mean (compound annual growth rate):

$$g_t = \left(\frac{B_{t-1}}{B_{t-3}} - 1\right)^{\frac{1}{3}} \tag{3.17}$$

Denoting $(P/B - PMB)$ as $PBPMB$ yields the final specification (note that this is a cross-sectional regression so the subscript t is removed):

$$PBPMB_i = \alpha + \beta_1 RI_i + \beta_2 g_i + u_i \tag{3.18}$$

Similarly to the application of the residual income valuation model, we perform this regression analysis at the end of March every year from 2002 to 2011. Subsequently, we use the coefficients to predict the price-to-book ratio for every company.

3.4 Trading strategy, portfolio formation and evaluation

3.4.1 Trading strategy

After applying both the direct RIV model as well as the relative valuation model we have two sets of P/B ratios for each company and year in our sample. The trading strategy is simple: In line with previous research (Skogsvik, 2008) we apply a buy-and-hold strategy. At the end of March, on the last trading day, we compare the actual P/B ratio for each company with their corresponding predicted P/B ratio. If the predicted P/B ratio is higher than the actual P/B ratio, we go long in the stock. If it is lower, we short sell the stock.

Table 3.2 Overview of investment criteria

The investment decisions in our trading strategies are based on the relation between the predicted P/B ratio and the actual P/B ratio.

Prediction vs. actual	**Action**
Predicted > Actual	Take long position
Predicted = Actual	No position taken
Predicted < Actual	Take short position

We make all investments at the end of March, and make no subsequent investments during the trading period. We then hold the investments during 12 month until the last trading day of March next year, when we close all positions.

3.4.2 Portfolio formation

To evaluate the investments on an aggregate level, we form a number of portfolios for each prediction model. Previous studies such as Skogsvik (2008) form a zero-cost portfolio where the proceeds from short sells fully cover the amount invested in the long portfolio. It would have facilitated comparisons to previous results if we were able to from such a portfolio ourselves. However, the zero-cost portfolio is not always realistic. For many years, the investments are not equally distributed between long and short investments (a distribution of long and short investments each year can be found in Table 4.2. The most extreme case produced by the RIV model is 2009, where 86% of our investments are long positions while only 14% are short. This means that a disproportionate fraction of the returns for the zero-cost portfolio emanates from the few short investments. To avoid this discrepancy, we instead form an equal-weighted portfolio, where the return from each investment has an equal share in the total portfolio return.

In addition, we also form long and short portfolios for each prediction model to evaluate their relative performance with respect to long and short positions. Naturally, the performance of the long and short portfolios is heavily dependent on the general market direction. However, our time period of 2002 to 2012 includes a quite equal distribution of bull and bear periods, which we can see in Table 4.2 Considering this, we believe that the performance of our long and short portfolios are worth some interest.

3.4.3 Portfolio evaluation

In order to evaluate whether the portfolios generate any abnormal returns, we have to examine if the returns can be explained by any known risk factors. For this purpose we apply both the capital asset pricing model (CAPM) and the Fama-French 3-factor model. This evaluation method investigates whether or not our portfolio returns are caused by risk loading (i.e. taking on greater level of risk) of the commonly known risk factors. If risk loading cannot explain our returns, then it implies that our portfolio has generated extra returns without taking on extra risk. This excess return is hence classified as abnormal returns.

3.4.4 Risk adjustments using the CAPM model

First, we investigate if the returns in our portfolios can be explained by the market risk premium in the capital asset pricing model alone. We calculate the monthly returns and perform a time series regression against the monthly market excess returns:

$$(r_t - r_{f,t}) = \alpha + \beta(r_{mkt,t} - r_{f,t}) + u_t \qquad 3.19$$

Where r_t is the return for the portfolio, $r_{f,t}$ is the risk-free rate and $r_{mkt,t}$ is the return for the market index in month t. We obtain $r_{f,t}$ and $r_{mkt,t}$ from Kenneth French's homepage[1]. The factors we obtain are European factors, based on countries in the Western Europe including Sweden.

In the equation above, the statistic of interest is the intercept α. If the regression results would yield an insignificant intercept, then it would imply that our portfolio returns could be explained as exposure to market risk. In other words, we have only received higher returns for taking on extra risk. On the other hand, if the intercept is significant, then it implies that exposure to market risk cannot fully explain our portfolio returns thereby indicating abnormal returns.

3.4.5 Risk adjustments using the Fama-French 3-factor model

Second, we investigate if the returns in our portfolios can be explained by the factors in the Fama-French 3-factor model, developed by Fama and French (1992). Explaining the Fama-French 3-factor model in detail is outside the scope of this study, but in essence, the Fama-French model adds two additional factors to the market factor in the CAPM model. The first one is small-minus-big (SMB), which measures the historical excess return of stocks with small market capitalization over stocks with big market capitalization. The second is high-minus-low (HML) which measures the historical excess return of stocks with high book-to-market ratio over stocks with low book-to-market ratio (high book-to-market is equivalent to low price-to-book, and vice versa). Again, we perform a similar time series regression on our portfolio monthly excess returns:

$$(r_t - r_{f,t}) = \alpha + \beta_1(r_{mkt,t} - r_{f,t}) + \beta_{SMB}SMB_t + \beta_{HML}HML_t + u_t \qquad 3.20$$

Where r_t is the return for the portfolio, $r_{f,t}$ is the risk-free rate, $r_{mkt,t}$ is the return for the market index, SMB_t is the small-minus-big factor and HML_t is the high-minus-low factor in month t. We obtain the Fama-French factors as well from Kenneth French's homepage, and again it is the European factors that we use. Similarly as before, if the intercept α is insignificant our interpretation is that our portfolio returns can be explained by the Fama-French factors, and if it is significant then we have achieved abnormal returns.

3.4.6 Industry analysis

Several of the previous studies have been stricter than us in terms of industry exclusions from their sample. Skogsvik (2008) and Skogsvik and Skogsvik (2010) only includes manufacturing companies,

[1] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html#HistBenchmarks

while Wilcox (1987) conducts empirical test on a per industry basis. As delineated in the sections above, we exclude certain industries that we expect are less suited for these types of prediction models. Still, we analyze our results by industry to investigate whether we can find any substantial differences.

In this approach, we construct several portfolios based on the ICB classification of industries using only the direct RIV model. We then evaluate the returns similarly to our main portfolios, and perform a Fama-French regression to control the returns for known risk factors.

4 Results and analysis

This section presents and evaluates the portfolio performance of our study. The section is divided into three parts. First, we present the results and analysis of our trading strategy based on the direct application of the RIV model and its corresponding portfolio (the direct portfolio). Second, we present the results and analysis of our relative residual income - price-to-book trading strategy and its resulting portfolio (the relative portfolio). For each model, we first describe the portfolio performance in general and casually compare our returns to the market return (MSCI World index), then we formally evaluate the risk-adjusted returns of our portfolios and conclude with some analysis and comparisons of the models. In the final part of this section we present the results of the industry portfolios.

4.1 Direct approach

4.1.1 Performance of the direct portfolio

Table 4.1 provides a decomposition of the direct portfolio performance. As displayed in the table, our returns varied quite significantly over the period 2002-2011, as did the composition between long and short stocks in our portfolio. During the ten-year period we found that our direct portfolio performed slightly better than the MSCI World index. In majority of the years our portfolio went against the direction of the market and the portfolio generated the largest amount of the excess returns during 2008 and 2009. In total our direct portfolio returned on average 8% per year. Due to positive market returns 2002-2011 our long positions returned 17% on average while our short positions returned -11% per year.

Table 4.1 Performance of the direct portfolio

Returns are the total portfolio returns of all long and short positions held from March and 12 month forward
MSCI is the MSCI world index return from March and 12 month forward
Return long is the return of all long positions held from March and 12 month forward
Return short is the return of all short positions held from March and 12 month forward
Nr of shorts is the total number of short postions taken in that year
Nr of longs is the total number of long postions taken in that year
Nr of stocks is the total number of stocks in portfolio
Long / short is the division of the number of long positions divided by the number of short posistion taken that year

Year	Return	MSCI World	Return Long	Return Short	No. of longs	No. of shorts	No. of stocks	Long/ short
2002	-2%	-24%	-24%	34%	44	26	70	1.69
2003	24%	36%	48%	-53%	51	16	67	3.19
2004	-1%	10%	36%	-29%	34	45	79	0.76
2005	-26%	16%	49%	-46%	19	72	91	0.26
2006	-3%	13%	16%	-8%	17	63	80	0.27
2007	8%	-5%	-22%	17%	21	66	87	0.32
2008	-8%	-43%	-45%	41%	44	34	78	1.29
2009	85%	45%	109%	-55%	71	12	83	5.92
2010	-6%	11%	16%	-20%	29	45	74	0.64
2011	6%	-1%	-9%	11%	19	52	71	0.37
Avg.	8%	6%	17%	-11%	35	43	78	1.47

Table 4.2 provides a detailed description of the direct portfolio performance along with some general market statistics. In 2002 the direct portfolio were able to perform better than MSCI World which declined -24%. But despite a high prediction rate in 2003 our direct portfolio underperformed index in the subsequent years 2003-2006. It is quite unexpected that such a high prediction rate of 72% would yield a lower return than the market in 2003. This is mainly caused by some extremely negative returns in our short positions during that year. In the subsequent recovery years 2004-2006, historical financials were hammered by poor results after the dot-com bubble in 2001-2002. Therefore the three-year average historical financials during 2004-2006 were in general low. When the historical residual income $\overline{RI_h}$ rebounded in 2006, market valuations were high (as indicated by the average P/B-PMB of our data sample), implying that the market had already priced in the increase in $\overline{RI_h}$. Due to the average low $\overline{RI_h}$ in 2004-2005 and the high valuations in 2006 our direct portfolio mainly held short positions during the years 2004-2006, when it significantly underperformed the bull markets during the same period.

In 2007, our direct model mainly took short positions, which indicated that market prices were high in relationship to the historical residual income levels. When the market started to fall during the year our portfolio gained. In 2008, market valuations were low compared to historical $\overline{RI_h}$ hence our portfolio included more long positions. However historical information was unable to predict the financial crisis that occurred later that year, hence our overall return was -8% for 2008. During the same period MSCI World declined -43%, our excess returns was mainly supported by strong returns generated in our short positions in 2008.

In the midst of the financial crisis in 2009, the majority of all stock prices were severely suppressed in comparison to its historical financials. Hence, relying on past profitability during the period of 2006-2008 proved to be a good investment strategy in 2009. The result indicate that temporary mispricing might have occurred in the beginning of 2009, where the suppressed market valuations caused a misalignment of P/B compared to $\overline{RI_h}$. Due to these low valuations our RIV model has been able to discover this misalignment and our portfolio benefited significantly from this one-off instance. Finally in 2010-2012, when the market valuations and $\overline{RI_h}$ were quite aligned, no apparent cause for over- or underperformance could be noticed.

The composition of the trading positions during the period 2002-2012 indicates that our RIV model is sensitive to misalignments of $\overline{RI_h}$ and observed P/B. Hence when valuations based on P/B were high, high $\overline{RI_h}$ was needed to justify a long position and vice versa. This shows that the direct RIV model has a good ability to distinguish stocks where the valuations are above or under historical fundamentals. This is aligned with findings from previous studies such as Penman and Sougiannis (1998), Frankel and Lee (1998) and Skogsvik and Skogsvik (2010), who confirms the practical applicability of the RIV model.

Furthermore we observe that in years when $\overline{RI_h}$ proved to be a good indicator of future RI, for example in 2009 our portfolio performed exceptionally well. In other periods such as 2004-2006 when historical information proved to be a bad indicator of future RI, our portfolio substantially underperformed. In general the results indicate that when historical information is a good predictor of future performance then our model could significantly benefit from it and vice versa.

Table 4.2 Descriptive statistics for the direct portfolio

Avg.RI is the historical three year average residual income averaged across all firms observed in March that year
Avg. $PBPMB_i$ is the observed P/B less PMB averaged across all firms in March that year
% Correct is the total percentage of correct predictions for all long / short positions taken in that period
Returns are the total portfolio returns of all long and short positions held from March and 12 month forward
MSCI is the MSCI world index return from March and 12 month forward
Excess returns is the return of our portfolio less the return of the MSCI index during the same period
Long / short is the division of the number of long positions divided by the number of short position taken that year

Year	Avg. RI	Avg. $PBPMB_i$	% Correct	Returns	MSCI	Excess return	Long/ short
2002	8%	1.62	43%	-2%	-24%	22%	1.69
2003	7%	0.99	72%	24%	36%	-12%	3.19
2004	0%	1.59	43%	-1%	10%	-12%	0.76
2005	1%	2.06	31%	-26%	16%	-42%	0.26
2006	8%	2.64	50%	-3%	13%	-16%	0.27
2007	11%	2.80	68%	8%	-5%	13%	0.32
2008	13%	1.91	47%	-8%	-43%	35%	1.29
2009	14%	1.16	82%	85%	45%	40%	5.92
2010	11%	2.23	45%	-6%	11%	-17%	0.64
2011	9%	2.47	65%	6%	-1%	7%	0.37
Avg	8%	1.95	55%	8%	6%	2%	1.47

4.1.2 CAPM risk-adjusted returns

The results of the CAPM risk-adjusted return show an insignificant monthly excess return α of 0.25% per month for the direct portfolio during 2002-2011. The low beta coefficient for the market premium is expected since our portfolio includes both long and short positions. Our long positions seemed to generate monthly excess returns of 0.46% while our short positions generated a monthly negative risk adjusted return of -0.40%. Neither of the two returns are significant. The market beta coefficient for both long and short positions were highly significant, indicating that all positions taken were exposed to market risk.

Table 4.3 CAPM risk-adjusted direct portfolio returns

α is the alpha stated in equation 3.19
β_1 is the coefficient for the market risk premium stated in equation 3.19

Portfolio	α	t-stat	p-value	β_1	t-stat	p-value
Direct portfolio	0.0025	0.812	0.418	0.079	1.542	0.125
Direct portfolio Long	0.0046	1.24	0.215	0.726	11.93	0.000
Direct portfolio Short	-0.0040	-1.04	0.298	-0.730	-11.48	0.000

4.1.3 Fama-French 3-factor model risk-adjusted returns

After adjusting for the Fama-French 3-factor model, we found that our direct portfolio generated an insignificant excess return of 0.20%. The size of the coefficients β_1 and β_{SMB} were small while the β_{HML} coefficient was significantly higher. This indicates that the portfolio returns can mainly be explained by exposure towards the HML risk factor. Again our long positions generated an insignificant excess return, while the short positions returned a negative risk adjusted return. Exposure towards the market risk premium β_1 had the most explanatory ability for both the long and short positions taken.

Table 4.4 Fama-French risk-adjusted direct portfolio returns

α is the alpha stated in equation 3.20

β_1, is the coefficient for the market risk premium stated in equation 3.20

β_{smb} is the coefficient for the small minus big risk premium stated in equation 3.20

β_{hml} is the coefficient for the market high minus low risk premium stated in equation 3.20

FF 3-Factor Results	α	t-stat	p-value	β_1	t-stat	p-value
Direct portfolio	0.0020	0.7140	0.4762	0.0250	0.4460	0.6559
Direct portfolio Long	0.0030	0.8280	0.4092	0.7260	10.9700	0.0000
Direct portfolio Short	-0.0030	-0.9060	0.3663	-0.7980	-11.5000	0.0000

FF 3-Factor Results	β_{smb}	t-stat	p-value	β_{hml}	t-stat	p-value
Direct portfolio	-0.1760	-1.1570	0.2494	0.3090	1.8610	0.0651
Direct portfolio Long	0.6080	3.4870	0.0006	0.0780	0.4110	0.6811
Direct portfolio Short	-0.6060	-3.3300	0.0011	0.3440	1.7300	0.0085

4.1.4 Analysis of the direct model

Our risk adjusted returns were insignificant when controlling for the risk factors of CAPM and the Fama-French 3-factor model. The sizes of the insignificant alpha were 0.25% and 0.20% per month. Comparing our return results to previous studies we find that our returns are aligned with the returns identified in the study by Skogsvik (2002). The abnormal return generated in her hedge position generated a monthly CAPM adjusted excess return of 0.33% but likewise her alpha returns were neither statically significant. Comparing our results to Skogsvik (2010) the indicator variable strategy showed an significant abnormal return of 0.8% per month after controlling for CAPM. Our direct portfolio returns proved to be far inferior to the returns generated in Skogsvik (2010). However, the data sample in Skogsvik (2010) was from 1983 to 2003 where the majority of the abnormal returns were generated in first third of the investment period. Therefore it is uncertain if the indicator strategy of Skogsvik (2010) would be superior to our direct portfolio returns if both were applied to the same time period 2002-2012.

Both studies (Skogsvik, 2002; Skogsvik and Skogsvik, 2010) showed a decrease in abnormal returns from the time period 1970-2003 and conclude that market valuations increasingly reflected available accounting information. They motivate this observation by stating that investor has become more sophisticated and access to public available accounting information has improved. As investors become more sophisticated, one can expect investors to make forecast of business outlooks based on market fundamentals and business assessments. Thereby investors incorporate historical accounting information along with other forward looking information to make their financial forecasts. Hence with an advanced set of prediction tools investors should be able to incorporate superior information than solely relying on historical financials to predict future performance.

The results of our direct portfolio returns further gives support to the previous findings above. With regards to our returns during 2002-2012, historical accounting information $\overline{RI_h}$ seemed to be a good but not sufficient indicator of future residual income. In periods when forward looking information should have been taken into account to a larger extent (for example trading years 2004-2006), our reliance on historical accounting information hindered us to take favorable growth outlooks into account. The insignificant alpha returns identified over the ten year period 2002-2012 shows that solely relying on historical accounting information is not sufficient to generate abnormal returns. The result of our direct portfolio are aligned with conclusions drawn in Skogsvik (2002), Skogsvik and Skogsvik (2010) and supports the use of both forward looking and historical information to predict future performance.

4.2 Relative approach

4.2.1 Cross-sectional regression results

We perform the regression as stated in Equation 3.18. The results of the regression shows that the coefficient β_1 for $\overline{RI_h}$ is significant over all prediction periods in the years 2002-2012. This implies that historical $\overline{RI_h}$ has significant cross-sectional explanation ability of observed price to book ratios. This result is aligned with previous studies (Wilcox, 1987; Penman, 1996), who found strong empirical evidence of the cross-sectional relationship between price-to-book and historical ROE.

However the coefficient β_2 for growth in book value was insignificant and negatively related to the P/B. This is somewhat unexpected since growth in book value is expected to increase the amount of residual income in absolute terms given that the ROE is unchanged. The observed results of the β_2 coefficient contradicts previous findings in Bernard (1994) who asserts that differences in the ROE-P/B relationship could be attributed to differences in growth in book value of equity. The unexpected results for the β_2 coefficient could be distorted by violations of the clean surplus relation through items recognized in the comprehensive income statement. Such items could be foreign exchange differences, unrealized financial assets, and so forth. As mentioned in the method section we did not use the comprehensive income statement when calculating historical ROE and growth in book value of equity.

The intercept α was significant in all years but the size of the intercept differed from year to year. A possible explanation to the variation in the intercept might be caused by the overall market sentiment. As displayed in the Table 4.5, in times when the market was optimistic during the period 2004-2007, despite a high significance level of $\overline{RI_h}$, the intercept α was higher than the intercept α in periods such as 2002 and 2009 when the market was pessimistic. Hence the size of the intercept α could be a result of the overall market sentiment “optimism / pessimism” that pushed the total market valuations up in bull markets such as 2003-2006 and down in bear markets 2002 and 2008-2009.

Table 4.5 Regression results for the relative model

Avg. RI is the historical three year average residual income averaged across all firms observed in March that year
Avg. $PBPMB_i$ is the observed P/B less PMB averaged across all firms in March that year
t-stat are significant at the 5% level
α is the alpha in the regression stated in equation 3.18
$\beta_1 RI_i$ is the coefficient for the three year average residual income observed in March that year stated in equation 3.18
$\beta_2 g_i$ is the coefficient for the three year average growth in book alue equity observed in March that year stated in equation 3.18

Year	Avg. RI	Avg. $PBPMB_i$	α	t-stat	p-value	$\beta_1 RI_i$	t-stat	p-value	$\beta_2 g_i$	t-stat	p-value
2002	8%	1.62	1.1	4.98	0.000	4.85	2.15	0.0350	0.61	2.15	0.673
2003	7%	0.98	0.73	6.48	0.000	7.47	5.74	0.0000	-3.23	5.74	0.003
2004	0%	1.58	1.51	11.71	0.000	5.15	3.43	0.0000	-1.35	3.43	0.417
2005	1%	2.05	1.98	14.11	0.000	3.1	2.26	0.0260	1.62	2.26	0.341
2006	8%	2.63	1.68	8.12	0.000	10.77	5.58	0.0000	-0.74	5.58	0.649
2007	11%	2.8	1.77	7.88	0.000	11.69	5.29	0.0000	-2.46	5.29	0.016
2008	13%	1.9	1.14	5.47	0.000	7.88	4.89	0.0000	-1.32	4.89	0.292
2009	14%	1.15	0.53	3.02	0.003	5.77	5.61	0.0000	-1.35	5.61	0.173
2010	11%	2.23	1.41	7.05	0.000	9.23	6.26	0.0000	-2.19	6.26	0.132
2011	9%	2.46	1.65	9.08	0.000	11.91	8.16	0.0000	-3.52	8.16	0.077
Average	8%	1.94	1.35	7.79	0.000	7.78	4.94	0.01	-1.39	4.94	0.28

Furthermore, we find varying significance level of the coefficient β_1. A possible interpretation of the variation of significance levels of β_1 could be that the explanatory ability of $\overline{RI_h}$ changes during different time periods. The lowest significance levels of β_1 were observed during 2002 and 2005, while the highest significance levels were in 2011 and in 2010. The varying significance level indicates that the usefulness of historical $\overline{RI_h}$ to predict future performance differs from year to year. In other words, in certain periods $\overline{RI_h}$ is a better predictor of future performance than in other periods. The low significance of $\overline{RI_h}$ observed in the beginning of 2002 could be explained by the negative market outlook caused by the dot-com bubble. At that time it is reasonable to expect that investors had limited confidence in firms' ability to continue generate the same amount of excess return going forward as they did in the prior periods. However in 2005 when the economic outlooks improved investors relied less on the historical low profitability levels showed in the books. This is consistent with our previous findings in the direct portfolio that also indicated the predictability of future performance using historical $\overline{RI_h}$ differed between periods.

4.2.2 Performance of the relative portfolio

In our attempt to exploit the cross sectional relationship between P/B and $\overline{RI_h}$, our resulting relative portfolio generated an average 4% return per year over the period 2002-2012. The portfolio underperformed both our benchmark index and our RIV portfolio by -2% and -4% per year during the period 2002-2012. In majority of the cases our portfolio went in the same direction as the MSCI World returns (i.e. had the same sign). This is contrary to returns generated in the direct portfolio. The return on the long and the short position averaged 17% and -15% annually. Surprisingly the average return on the long positions were exactly the same in the direct and relative approach. Negative returns in the short positions contributed the most to the decline in overall return performance. However, in total the relative portfolio underperformed both MSCI World index and the direct portfolio. Table 4.6 below shows the decomposition of the relative portfolio performance.

Table 4.6 Performance of the relative portfolio

Returns are the total portfolio returns of all long and short positions held from March and 12 month forward
MSCI is the MSCI world index return from March and 12 month forward
Return long is the return of all long positions held from March and 12 month forward
Return short is the return of all short positions held from March and 12 month forward
Nr of shorts is the total number of short postions taken in that year
Nr of longs is the total number of long postions taken in that year
Nr of stocks is the total number of stocks in portfolio
Long / short is the division of the number of long positions divided by the number of short posistion taken that year

Year	Relative Returns	MSCI world	Direct Returns	Return Long	Return Short	Nr of longs	Nr of shorts	Nr of stocks	Long/ short
2002	-3%	-24%	-2%	-24%	35%	45	25	70	1.80
2003	10%	36%	24%	47%	-52%	42	25	67	1.68
2004	7%	10%	-1%	34%	-30%	46	33	79	1.39
2005	3%	16%	-26%	40%	-57%	56	35	91	1.60
2006	8%	13%	-3%	17%	-1%	42	37	80	1.14
2007	-5%	-5%	8%	-19%	16%	52	34	87	1.53
2008	-11%	-43%	-8%	-45%	40%	47	30	78	1.57
2009	27%	45%	85%	106%	-94%	50	32	83	1.56
2010	2%	11%	-6%	19%	-18%	39	35	74	1.11
2011	2%	-1%	6%	-8%	13%	37	33	71	1.12
Avg.	4%	6%	8%	17%	-15%	45.6	31.9	78	1.45

Table 4.7 provides a detailed description of the relative portfolio along with some overall market statistics. The relative portfolio held a more even distribution of long / short stocks than compared to the direct portfolio.

The direct portfolio took a larger share of long / short positions in periods when the historical residual income was low and valuations were high and vice versa. But in general the relative portfolio held a more even distribution of long / short stocks than compared to direct portfolio. The likely explanation of the more balanced positions is caused by the influence of the intercept α, described previously as the market sentiment, indicating the market "optimistic/pessimistic" identified in the beginning of each period. Except for the influence of the intercept α, annual trading patterns were quite similar to that of the direct portfolio.

In 2002-2003, high $\overline{RI_h}$ led us to take a larger share of long positions. However as indicated by the low intercept α the overall market was pessimistic in 2003, hence a great deal of market pessimism pushed down market valuations. Therefore despite high average $\overline{RI_h}$ our cross sectional regression took less long positions than previously (in direct portfolio*)*. In subsequently years 2004-2005 when $\overline{RI_h}$ was low a high intercept α helped us take more long positions than justified by the $\overline{RI_h}$. Thereby we were able to take advantage of the market optimism during that period and make a positive return as compared to the negative returns generated by the direct portfolio.

As market valuations went up in 2006-2007 our regression model was also able to recognize the higher valuations relative to the observed RI_h and the portfolio shifted towards more short positions. In the midst of the financial crises 2008-2009, when observed P/B started to decline but $\overline{RI_h}$ stayed afloat, the relative portfolio again increased its long positions. Again limited by the market pessimism (i.e. low intercept α observed in 2009), we were unable to fully benefit from the extreme misalignment of $\overline{RI_h}$ and P/B as we did in direct portfolio in 2009. Finally in 2010-2012 when $\overline{RI_h}$ and market valuations converged our relative portfolio took a balanced positions in long and short positions hence yielding a return of 2% per year.

Table 4.7 Descriptive statistics for the relative portfolio

Avg.RI is the historical three year average residual income averaged across all firms observed in March that year
Avg. $PBPMB_i$is the observed P/B less PMB averaged across all firms in March that year
% Correct is the total percentage of correct predictions for all long / short positions taken in that period
Returns are the total portfolio returns of all long and short positions held from March and 12 month forward
MSCI is the MSCI world index return from March and 12 month forward
Excess returns is the return of our portfolio less the return of the MSCI index during the same period
Long / short is the division of the number of long positions divided by the number of short posistion taken that year
α is the alpha in the regression stated in equation 3.18
$\beta_1 RI_i$ is the coefficient for the three year average residual income observed in March that year stated in equation 3.18

Year	Avg. RI	Avg. $PBPMB_i$	% Correct	Returns	MSCI	Excess Returns	Long/short	α	$\beta_1 RI_i$
2002	8%	1.62	43%	-3%	-24%	21%	1.8	1.1	4.85
2003	7%	0.99	72%	10%	36%	-26%	1.68	0.73	7.47
2004	0%	1.59	43%	7%	10%	-3%	1.39	1.51	5.15
2005	1%	2.06	31%	3%	16%	-14%	1.6	1.98	3.1
2006	8%	2.64	50%	8%	13%	-5%	1.14	1.68	10.77
2007	11%	2.8	68%	-5%	-5%	0%	1.33	1.77	11.69
2008	13%	1.91	47%	-11%	-43%	31%	1.57	1.14	7.88
2009	14%	1.16	82%	27%	45%	-18%	1.56	0.53	5.77
2010	11%	2.23	45%	2%	11%	-10%	1.11	1.41	9.23
2012	9%	2.47	65%	2%	-1%	3%	1.12	1.65	11.91
Avg.	8%	1.94	54%	4%	6%	-2%	1.45	1.35	7.78

4.2.3 CAPM risk-adjusted returns

The CAPM risk adjusted returns relative portfolio resulted in an insignificant monthly α of 0.1% Compared to the direct portfolio we observed an insignificant CAPM risk adjusted return of 0.25%. Similar to the RIV outputs our long positions generated positive CAPM risk adjusted return of 0.4% while the short positions generated negative CAPM adjusted returns of -0.7%. Neither of the returns were significant however the negative alpha in our short positions was almost significant. Table 4.8 summarizes the CAPM risk-adjusted returns.

Table 4.8 CAPM risk-adjusted relative portfolio returns

α is the alpha stated in equation 3.19
β_1 is the coefficient for the market risk premium stated in equation 3.19

CAPM reg. results	α	t-stat	p-value	β_1	t-stat	p-value
Relative portfolio	0.0010	0.628	0.531	0.123	4.865	0.000
Relative portfolio long	0.0042	1.174	0.243	0.734	12.355	0.000
Relative portfolio short	-0.0074	-1.798	0.075	-0.007	-10.291	0.000

4.2.4 Fama-French 3-factor model risk-adjusted returns

The Fama-French 3-factor model risk-adjusted returns showed an insignificant excess return of 0.02% per month. Compared to the result in direct portfolio the excess return was identified at 0.20% per month. The size of the coefficient β_1 was small while the β_{Hml} coefficient was significantly higher. This time both long and short positions were similarly explained by a high exposure towards small stocks. Table 4.9 summarizes the Fama-French risk-adjusted returns

Table 4.9 Fama-French risk-adjusted relative portfolio returns

α is the alpha stated in equation 3.20
β_1 is the coefficient for the market risk premium stated in equation 3.20
β_{smb} is the coefficient for the small minus big risk premium stated in equation 3.20
β_{Hml} is the coefficient for the market high minus low risk premium stated in equation 3.20

FF3 Factor Results	α	t-stat	p-value	β_1	t-t-stat	p-value
Relative portfolio	0.0002	0.100	0.917	0.082	3.018	0.003
Relative portfolio long	0.0020	0.663	0.509	0.721	11.370	0.000
Relative portfolio short	-0.0060	-1.450	0.149	-0.007	-10.350	0.000

FF3 Factor Results	β_{smb}	t-t-stat	p-value	β_{Hml}	t-t-stat	p-value
Relative portfolio	0.087	1.201	0.232	0.259	3.292	0.001
Relative portfolio long	0.663	3.970	0.000	0.162	0.887	0.376
Relative portfolio short	-0.008	-4.645	0.000	0.001	0.692	0.491

4.2.5 Analysis of the relative model

The results of our cross sectional regression shows a consistent significant relationship between P/B and $\overline{RI_h}$. Over the period 2002-2012, we found that the $\overline{RI_h}$ coefficient is continuously significant. However we have observed that the significance levels of the coefficient $\overline{RI_h}$ varies over time. This indicates that the usefulness of $\overline{RI_h}$ to predict future RI differs from period to period.

Our resulting relative portfolio underperformed both index and direct portfolio. When adjusted for CAPM and Fama-French 3-factor model, the relative portfolio showed insignificant abnormal returns of 0.10% and 0.02% per month over the period 2002-2012. Two possible explanations for the insignificant returns are offered. The first is the varying intercept α which resulted in our cross-sectional regression model and the second is related to the predictability of historical information.

First of all given the varying size of the intercepts each year, the regression based predicted P/B values have been influenced by the market sentiment (intercept α) at that particular period. Second similar to the direct portfolio and relative portfolio we assumed that the $\overline{RI_h}$ is a good indicator of future performance. However despite the significant relationship between P/B and $\overline{RI_h}$ our portfolio was not able to generate any abnormal returns by exploiting this cross sectional relationship. The results indicates that solely relying on historical information as an indicator of future performance is not sufficient enough to generate abnormal returns in our cross sectional prediction. The findings in the relative portfolio are consistent with the previous findings in direct portfolio.

Our result further supports the findings from Penman (1996) who states that in general historical ROE is relevant but not sufficient to provide information about future ROE. This is additionally supported by a more recent study by Nilsson and Mccrae (2001) who found that cross sectional stock returns based on the RIV model were improved when analysts forecast was incorporated along with the historical accounting information.

To conclude, in the general market our trading strategy based on the cross sectional $\overline{RI_h}$ - P/B relationship resulted in an insignificant alpha return during the period 2002-2012. In line with the conclusions drawn in direct portfolio the result of the relative portfolio also supports the use of both historical and other forward looking information to make more precise predictions of future performance.

4.3 Industry analysis

Several previous studies have been stricter than us in terms of industry exclusions from their sample. Skogsvik (2008) and Skogsvik and Skogsvik (2010) only includes manufacturing companies, while Wilcox (1987) conducts empirical test on a per industry basis. In this section we will analyze our results industry by industry. As previously mentioned, we have already excluded certain industries that we expect are less suited for these types of prediction models. However, we still find some interesting differences between the industries included in our sample.

For the direct model, we find that the highest returns emanates from investments in companies belonging to the basic material, consumer services industries and consumer goods (Table 4.10). These investments generate an average return during 2002-2012 of 25%, 17% and 13% respectively. However, as displayed in the tables below these returns are not stable over time.

Table 4.10 Performance of the direct portfolio by industry

Year	Basic Materials	Industrials	Consumer Goods	Consumer Services	Financials	Technology
2002	-3%	-1%	-4%	-21%	-1%	76%
2003	12%	27%	28%	56%	11%	N/A
2004	-7%	-9%	16%	-3%	14%	6%
2005	-5%	-42%	-6%	-16%	-21%	-22%
2006	20%	-12%	-7%	2%	9%	17%
2007	-5%	13%	2%	31%	-16%	8%
2008	-9%	5%	-40%	-6%	-9%	-37%
2009	243%	74%	123%	119%	71%	-10%
2010	-9%	-11%	5%	2%	16%	0%
2011	12%	3%	18%	8%	2%	-1%
Avg.	25%	5%	13%	17%	8%	4%

Surprisingly, the investment within industrials does not fare well with an average return of only 5%. Our initial expectation was that our valuation approach would suit industrial companies well, since previous studies such as Skogsvik (2008) and Skogsvik and Skogsvik (2010) have focused on only manufacturing companies with good results. The basic assumption underlying our research approach is still the notion that past performance is a good predictor of future performance. In light of this, it is reasonable to expect that the models will have varying performance across different industries. One possible explanation can be the different levels of cyclicality across industries, where non-cyclical companies with more stable earnings would be more suitable for the model. This could explain the strong performance of consumer goods and consumer services, two industries often regarded as non-cyclical. However with regards to the high return observed in the basic material industry, the inference above does not seem to be applicable on general level.

To control for risk, we performed a regression analysis of the excess return of the industry portfolio against the Fama-French 3-factor model. Table 4.11 below shows the results.

Table 4.11 Fama-French risk-adjusted direct portfolio returns by industry

α is the alpha stated in equation 3.20

β_1 is the coefficient for the market risk premium stated in equation 3.20

β_smb is the coefficient for the small minus big risk premium stated in equation 3.20

β_hml is the coefficient for the market high minus low risk premium stated in equation 3.20

FF3 Factor Results	α	t-stat	p-value	β_1	t-stat	p-value
Basic materials	0.0096	1.7102	0.0899	0.1188	1.1422	0.2557
Consumer goods	0.0025	0.5361	0.5929	0.2444	2.7977	0.0060
Consumer serivces	0.0076	1.1273	0.2619	0.2403	1.9144	0.0580
Industrials	0.0008	0.2133	0.8314	-0.0910	-1.3870	0.1681
Financials	0.0031	0.7313	0.4661	0.0305	0.3827	0.7027
Telecommunicatons	0.0018	0.3364	0.7375	-0.1309	-1.2335	0.2210

FF3 Factor Results	*β_smb*	t-stat	p-value	*β_hml*	t-stat	p-value
Basic materials	-0.5553	-2.0261	0.0451	0.7206	2.4090	0.0176
Industrials	-0.3923	-2.2699	0.0251	0.2609	1.3830	0.1693
Consumer goods	0.3746	1.6274	0.1064	0.5325	2.1196	0.0362
Consumer serivces	0.2876	0.8697	0.3862	0.2474	0.6853	0.4945
Financials	-0.3355	-1.5991	0.1125	0.3836	1.6756	0.0965
Telecommunicatons	-0.1309	-1.2335	0.2210	0.1384	0.4404	0.6609

As displayed in the table above, none of the industry portfolios generate any significant alpha through our direct RIV model. However the industry groups basic materials and consumer services had the highest significance in terms of alpha.

Table 4.12 displays the fraction of correct predictions across industry groups. As noted below the differences between industries are quite small in average.

Table 4.12 Direct model portfolio correct predictions by industry

Year	Basic Materials	Industrials	Consumer Goods	Consumer Services	Financials	Technology
2002	43%	46%	50%	17%	29%	100%
2003	71%	71%	70%	100%	71%	N/A
2004	33%	32%	64%	43%	71%	100%
2005	50%	14%	40%	44%	33%	75%
2006	86%	36%	50%	67%	50%	75%
2007	57%	78%	50%	83%	40%	67%
2008	40%	63%	17%	50%	38%	25%
2009	80%	85%	82%	83%	80%	67%
2010	25%	39%	67%	50%	60%	40%
2011	50%	63%	91%	50%	67%	60%
Avg.	54%	53%	58%	59%	54%	68%

In conclusion, when controlling for industry differences the performance of our industry portfolios based on the direct method using historical accounting information could not generate any significant alpha returns during 2002-2011. The result of the industry analysis further supports our main finding that solely relying on historical accounting information is not sufficient to generate abnormal returns.

5 Summary and conclusions

As accounting scholars fascinated about the fundamental drivers of key equity valuation concepts, we have been inspired by the works such as Ou and Penman (1989), Skogsvik (2002), Skogsvik and Skogsvik (2010), and Frank and Lee (1998). The studies above indicated that abnormal returns could be generated by rigorous fundamental analysis based on historical accounting information. The simplicity of the residual income valuation model and its direct linkage to the price-to-book ratio attracted our attention to further investigate the application of the framework. By connecting these hints of finding potential mispricing we were intrigued to discover whether or not a direct or a relative RIV-application using only historical accounting information could continue to generate abnormal returns in the current financial markets.

In this study we investigated if prediction models based solely on publicly available historical could generate abnormal returns on the Swedish stock market 2002-2012. Previous studies either performed their studies on data from periods within the range 1970-2003 or used a mixture of historical and forward-looking information. Other studies who have identified the cross-sectional P/B-ROE relationship never attempted to exploit this relationship in a trading strategy. Hence in our effort to answer the research question above, we started from the residual income valuation framework and constructed two prediction models and corresponding portfolios. One portfolio based on the direct RIV model (direct portfolio) and the other one based on the relative valuation using a cross-sectional regression (relative portfolio). Both valuation methods solely used historical three-year averages of $\overline{RI_h}$, growth in book value of equity and dividend pay-out ratio as the input.

Both the direct portfolio and the relative portfolio during the entire period 2002-2012 generated insignificant CAPM alpha returns of 0.25% and 0.10% respectively. When adjusted for the Fama-French 3-factor model we received insignificant alpha returns of 0.20% and 0.02% respectively. The results of the two portfolios both indicate that when historical information is a good indicator of future residual income then our portfolios generated good returns, but when it was not a good indicator of future residual income our portfolios suffered. The direct portfolio outperformed the relative portfolio since it was able to avoid the market sentiment (optimism or pessimism) identified in the beginning of each period in our regression analysis. The observed difference in the significance level of the coefficient β_1 (i.e. three year average residual income) over time indicated that the market reliance on historical information changed from period to period. But since both of our portfolios were solely dependent on historical accounting information we were not able decrease our dependency on it although market conditions in certain periods would have suggested otherwise.

Furthermore, even after controlling for differences across industries, we were unable to generate any abnormal returns using historical information.

In total, our study has found that solely relying on historical information could not generate any excess returns in the Swedish equity market during the period 2002-2012. Our findings are aligned with previous studies (Skogsvik, 2008; Skogsvik and Skogsvik, 2010) that concludes that the Swedish equity market has become more efficient over time. Furthermore our study also supports the inferences drawn in Penman (1996) that historical ROE provides some but not sufficient information about future ROE, and therefore other information is needed to determine future ROE.

In future studies we recommend the use of forward-looking information to complement historical financials in order to improve prediction rates in a search for abnormal returns from 2012 and onwards.

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7 Appendix

7.1 ICB Industry Classifications

Industry	Subsector	Included?	PMB industry
0001 Oil & Gas	0533 Exploration & Production		
	0537 Integrated Oil & Gas		
	0573 Oil Equipment & Services		
	0577 Pipelines		
	0583 Renewable Energy Equipment		
	0587 Alternative Fuels		
1000 Basic Materials	1353 Commodity Chemicals	Incl.	Chemical industry
	1357 Specialty Chemicals	Incl.	Chemical industry
	1733 Forestry	Incl.	Pulp and paper
	1737 Paper	Incl.	Pulp and paper
	1753 Aluminium	Incl.	Engineering
	1755 Nonferrous Metals	Incl.	Engineering
	1757 Iron & Steel	Incl.	Engineering
	1771 Coal		
	1773 Diamonds & Gemstones		
	1775 General Mining		
	1777 Gold Mining		
	1779 Platinum & Precious Metals		
2000 Industrials	2353 Building Materials & Fixtures	Incl.	Building and construction
	2357 Heavy Construction	Incl.	Building and construction
	2713 Aerospace	Incl.	Engineering
	2717 Defense	Incl.	Engineering
	2723 Containers & Packaging	Incl.	Engineering
	2727 Diversified Industrials	Incl.	Engineering
	2733 Electrical Components & Equipment	Incl.	Engineering
	2737 Electronic Equipment	Incl.	Engineering
	2753 Commercial Vehicles & Trucks	Incl.	Engineering
	2757 Industrial Machinery	Incl.	Engineering
	2771 Delivery Services	Incl.	Other service
	2773 Marine Transportation	Incl.	Shipping
	2775 Railroads	Incl.	Engineering
	2777 Transportation Services	Incl.	Other service
	2779 Trucking	Incl.	Other service
	2791 Business Support Services	Incl.	Consultants and computer
	2793 Business Training & Employment Agencies	Incl.	Consultants and computer
	2795 Financial Administration	Incl.	Consultants and computer
	2797 Industrial Suppliers	Incl.	Trading and retail
	2799 Waste & Disposal Services	Incl.	Other service
3000 Consumer Goods	3353 Automobiles	Incl.	Other production
	3355 Auto Parts	Incl.	Engineering
	3357 Tires	Incl.	Engineering
	3533 Brewers	Incl.	Consumer goods
	3535 Distillers & Vintners	Incl.	Consumer goods
	3537 Soft Drinks	Incl.	Consumer goods
	3573 Farming & Fishing	Incl.	Other production
	3577 Food Products	Incl.	Other production
	3722 Durable Household Products	Incl.	Consumer goods
	3724 Nondurable Household Products	Incl.	Consumer goods
	3726 Furnishings	Incl.	Consumer goods
	3728 Home Construction	Incl.	Consumer goods
	3743 Consumer Electronics	Incl.	Consumer goods
	3745 Recreational Products	Incl.	Consumer goods
	3747 Toys	Incl.	Consumer goods
	3763 Clothing & Accessories	Incl.	Consumer goods
	3765 Footwear	Incl.	Consumer goods
	3767 Personal Products	Incl.	Consumer goods
	3785 Tobacco	Incl.	Consumer goods
4000 Health Care	4533 Health Care Providers		
	4535 Medical Equipment		
	4537 Medical Supplies		
	4573 Biotechnology		
	4577 Pharmaceuticals		

5000 Consumer Services	5333 Drug Retailers	Incl.	Trading and retail
	5337 Food Retailers & Wholesalers	Incl.	Trading and retail
	5371 Apparel Retailers	Incl.	Trading and retail
	5373 Broadline Retailers	Incl.	Trading and retail
	5375 Home Improvement Retailers	Incl.	Trading and retail
	5377 Specialized Consumer Services	Incl.	Trading and retail
	5379 Specialty Retailers	Incl.	Trading and retail
	5553 Broadcasting & Entertainment	Incl.	Other service
	5555 Media Agencies	Incl.	Other service
	5557 Publishing	Incl.	Other service
	5751 Airlines	Incl.	Capital-intensive service
	5752 Gambling	Incl.	Other service
	5753 Hotels	Incl.	Other service
	5755 Recreational Services	Incl.	Real estate
	5757 Restaurants & Bars	Incl.	Other service
	5759 Travel & Tourism	Incl.	Other service
6000 Telecommunications	6535 Fixed Line Telecommunications	Incl.	Engineering
	6575 Mobile Telecommunications	Incl.	Engineering
7000 Utilities	7535 Conventional Electricity	Incl.	Capital-intensive service
	7537 Alternative Electricity	Incl.	Capital-intensive service
	7573 Gas Distribution	Incl.	Capital-intensive service
	7575 Multi-utilities	Incl.	Capital-intensive service
	7577 Water	Incl.	Capital-intensive service
8000 Financials	8355 Banks	Incl.	Other service
	8532 Full Line Insurance	Incl.	Other service
	8534 Insurance Brokers	Incl.	Other service
	8536 Property & Casualty Insurance	Incl.	Other service
	8538 Reinsurance	Incl.	Other service
	8575 Life Insurance	Incl.	Other service
	8633 Real Estate Holding & Development		
	8637 Real Estate Services		
	8671 Industrial & Office REITs		
	8672 Retail REITs		
	8673 Residential REITs		
	8674 Diversified REITs		
	8675 Specialty REITs		
	8676 Mortgage REITs		
	8677 Hotel & Lodging REITs		
	8771 Asset Managers		
	8773 Consumer Finance	Incl.	Other service
	8775 Specialty Finance		
	8777 Investment Services	Incl.	Other service
	8779 Mortgage Finance	Incl.	Other service
	8985 Equity Investment Instruments		
	8995 Nonequity Investment Instruments		
9000 Technology	9533 Computer Services		
	9535 Internet		
	9537 Software		
	9572 Computer Hardware	Incl.	Consultants and computer
	9574 Electronic Office Equipment	Incl.	Consultants and computer
	9576 Semiconductors	Incl.	Consultants and computer
	9578 Telecommunications Equipment	Incl.	Consultants and computer

7.2 PMB estimated by Runsten (1998)

Industry	**PMB**
Engineering	0.33
Pulp and paper	0.67
Chemical industry	0.44
Building and construction	0.48
Consumer goods	0.72
Pharmaceutical	1.74
Other production	0.31
Trading and retail	0.47
Consultants and computer	0.59
Capital-intensive service	0.76
Other service	0.62
Conglomerate and mixed investments	0.28
Shipping	0.65
Real estate	0.56
Investment companies	0.68
Mixed building. construction and real estate	0.55

7.3 Companies in sample by year

Year 2002	Year 2003	Year 2003
ACAP INVESTL 'B'	ALLGON B DEAD - DELIST 18/04/03	ACSC DEAD - 31/12/07
ASSA ABLOY B	AF 'B'	AF 'B'
BNS INDUSTRIER	ATLAS COPCO 'A'	ATLAS COPCO 'A'
NA	AXFOOD	G & L BEIJER
C TECHNOLOGIES	G & L BEIJER	BILIA 'A'
ATLAS COPCO A	BILIA 'A'	REDERI AB TNSAT.'B'
AVANZA	REDERI AB TNSAT.'B'	BROSTROM DEAD - 02/03/09
HEMKOPSKEDJAN	CONCORDIA MARITIME 'B'	HOME PROPERTIES DEAD - DEAD 11/05/09
NA	BETSSON 'B'	CONCORDIA MARITIME 'B'
NA	ELANDERS 'B'	CONSILIUM 'B'
BEIJER ALMA B	ELEKTRONIKGRUPPEN BK 'B' DEAD - 28/09/11	DUROC 'B'
NA	ELECTROLUX 'B'	ELANDERS 'B'
CHERRY FORETAGEN 'B'	ERICSSON 'B'	ELEKTRONIKGRUPPEN BK 'B' DEAD - 28/09/11
BILIA A	LAMMHULTS DESIGN GROUP	ELECTROLUX 'B'
BJORN BORG AB	FAGERHULT	LAMMHULTS DESIGN GROUP
BONG LJUNGDAHL 'B'	FENIX OUTDOOR 'B'	FAGERHULT
CONSILIUM B	SWEDBANK 'A'	SWEDBANK 'A'
DUROC B	GORTHON LINES DEAD - MERGED 307065	GORTHON LINES DEAD - MERGED 307065
ELECTRA GRUPPEN	GUNNEBO	GUNNEBO
ELECTROLUX B	GEVEKO 'B'	GEVEKO 'B'
ELEKTRONIKGRUPPEN BK B	HEXAGON 'B'	HL DISPLAY 'B' DEAD - 20/09/10
ERICSSON 'B'	HL DISPLAY 'B' DEAD - 20/09/10	HOGANAS 'B'
NA	HALDEX	HOLMEN 'B'
FJALLRAVEN B	HOGANAS 'B'	XANO INDUSTRI 'B'
HAKON INVEST AB	HOLMEN 'B'	KARLSHAMNS DEAD - 14/11/05
HOLMEN B	INTELLECTA 'B'	KABE HUSVAGNAR 'B'
HOGANAS B	XANO INDUSTRI 'B'	KAROLIN MACHINE TOOL DEAD - 04/02/08
ITAB SHOP CONCEPT B	RORVIK TIMBER	MALMBERGS ELEKTRISKA 'B'
NA	KARLSHAMNS DEAD - 14/11/05	MUNTERS
INTELLECTA B	KABE HUSVAGNAR 'B'	NCC 'B'
KABE HUSVAGNAR B	KLIPPAN DEAD - 05/05/06	NORDEA BANK
EXPANDA 'B'	LGP ALLGON HOLDING DEAD - 29/05/04	NARKES ELECTRISKA DEAD - 03/11/06
NA	MUNTERS	NEFAB 'B' DEAD - 03/12/07
MALMBERGS ELEKTRISKA	ZODIAK TELEVISION 'B' DEAD - 18/08/08	NEW WAVE GROUP 'B'
MOD.TIMES GP.MTG 'B'	NCC 'B'	NIBE INDUSTRIER 'B'
MULTIQ	NORDEA BANK	OEM INTERNATIONAL 'B'
NCC B	NARKES ELECTRISKA DEAD - 03/11/06	OMX DEAD - 05/05/08
NIBE INDUSTRIER B	NEFAB 'B' DEAD - 03/12/07	PANDOX DEAD - 20/02/04
NET INSIGHT B	NEW WAVE GROUP 'B'	PEAB 'B'
NEW WAVE GROUP B	NIBE INDUSTRIER 'B'	ROTTNEROS
NA	NOLATO 'B'	RORVIK TIMBER
NOLATO B	OEM INTERNATIONAL 'B'	SAAB 'B'
NORDNET SECURITIES BANK	OMX DEAD - 05/05/08	SALUS ANSVAR 'B'
OEM INTERNATIONAL B	PANDOX DEAD - 20/02/04	SANDVIK
NA	PEAB 'B'	SAPA DEAD - T/O 936884
PEAB B	PROFILGRUPPEN 'B'	SARDUS DEAD - 30/04/07
VIKING TELECOM	ROTTNEROS	SCA 'B'
PRICER B	SALUS ANSVAR 'B'	SCANDIACONSULT DEAD - DEAD-08/05/03
PROFFICE B	SANDVIK	SCANIA 'B'
PROFILGRUPPEN B	SAPA DEAD - T/O 936884	SKANDIA FORSAKRINGS DEAD - 06/06/06
REJLERS	SARDUS DEAD - 30/04/07	SEB 'A'
NA	SCA 'B'	SECURITAS 'B'
SCANIA B	SCANDIACONSULT DEAD - DEAD-08/05/03	SVENSKA HANDBKN.'A'
SKF B	SCANIA 'B'	SKANSKA 'B'
SWECO B	SKANDIA FORSAKRINGS DEAD - 06/06/06	SKF 'B'
NA	SEB 'A'	SSAB 'A'
SECURITAS B	SECURITAS 'B'	SVEDBERGS I DALSTORP 'B'
NA	SEMCON	SWECO 'B'
SKANSKA B	SVENSKA HANDBKN.'A'	SWEDISH MATCH
NA	SKANSKA 'B'	TIVOX 'B' DEAD - 26/08/05
SVEDBERGS B	SKF 'B'	TRELLEBORG 'B'
SCA B	SSAB 'A'	VBG GROUP
SVENSKA HANDBKN. 'A'	SVEDBERGS I DALSTORP 'B'	VLT 'B' DEAD - 03/11/08
SWEDOL	SWEDISH MATCH	VOLVO 'B'
TELE2 B	TRELLEBORG 'B'	BORAS WAFVERI 'B'
TELIA	TURNIT 'B' DEAD - T/O BY 690556	XPONCARD DEAD - 20/06/08
UNIFLEX B	VBG GROUP	
VBG	VLT 'B' DEAD - 03/11/08	
VOLVO B	BORAS WAFVERI 'B'	
ITAB INDUSTRI 'B'	XPONCARD DEAD - 20/06/08	
ANGPANNEFORENINGEN 'B'		

Year 2004	Year 2005	Year 2006
ACSC DEAD - 31/12/07	ACSC DEAD - 31/12/07	AF 'B'
AF 'B'	AF 'B'	ASSA ABLOY 'B'
ASSA ABLOY 'B'	ASSA ABLOY 'B'	ATLAS COPCO 'A'
ATLAS COPCO 'A'	ATLAS COPCO 'A'	AXFOOD
AXFOOD	AUDIODEV 'B' DEAD - 18/06/09	AVANZA BANK HOLDING
AVANZA BANK HOLDING	AXFOOD	BEIJER ALMA 'B'
BEIJER ALMA 'B'	AXIS	G & L BEIJER
G & L BEIJER	AVANZA BANK HOLDING	BEIJER ELECTRONICS
BILIA 'A'	BEIJER ALMA 'B'	BILIA 'A'
REDERI AB TNSAT.'B'	G & L BEIJER	BILLERUD
BRIO 'B' DEAD - 13/06/11	BEIJER ELECTRONICS	BONG
BROSTROM DEAD - 02/03/09	BILIA 'A'	DORO
HOME PROPERTIES DEAD - DEAD 11/05/09	BONG	ELANDERS 'B'
CONCORDIA MARITIME 'B'	BOSS MEDIA DEAD - 21/04/08	ELEKTRONIKGRUPPEN BK 'B' DEAD -
CONSILIUM 'B'	BRIO 'B' DEAD - 13/06/11	ELECTROLUX 'B'
DORO	BROSTROM DEAD - 02/03/09	ENIRO
DUROC 'B'	HOME PROPERTIES DEAD - DEAD 11/05/09	ERICSSON 'B'
ELANDERS 'B'	DORO	LAMMHULTS DESIGN GROUP
ELEKTRONIKGRUPPEN BK 'B' DEAD - 28/09/11	ELANDERS 'B'	FAGERHULT
ELECTROLUX 'B'	ELEKTRONIKGRUPPEN BK 'B' DEAD - 28/09/11	FENIX OUTDOOR 'B'
LAMMHULTS DESIGN GROUP	ELECTROLUX 'B'	SWEDBANK 'A'
FAGERHULT	LAMMHULTS DESIGN GROUP	GUNNEBO
FENIX OUTDOOR 'B'	FAGERHULT	GEVEKO 'B'
SWEDBANK 'A'	FINGERPRINT CARDS 'B'	HQ
FINNVEDEN 'B' DEAD - DEAD 21/02/05	FENIX OUTDOOR 'B'	HL DISPLAY 'B' DEAD - 20/09/10
GORTHON LINES DEAD - MERGED 307065	SWEDBANK 'A'	HALDEX
GUNNEBO	GUNNEBO	HOGANAS 'B'
GEVEKO 'B'	GEVEKO 'B'	HOLMEN 'B'
HL DISPLAY 'B' DEAD - 20/09/10	HQ	INTELLECTA 'B'
HALDEX	HEXAGON 'B'	KABE HUSVAGNAR 'B'
HOGANAS 'B'	HL DISPLAY 'B' DEAD - 20/09/10	MALMBERGS ELEKTRISKA 'B'
HOLMEN 'B'	HALDEX	MEKONOMEN
INTELLECTA 'B'	HOGANAS 'B'	MODERN TIMES GP.MTG 'B'
XANO INDUSTRI 'B'	HOLMEN 'B'	MUNTERS
KARLSHAMNS DEAD - 14/11/05	INTELLECTA 'B'	NCC 'B'
KABE HUSVAGNAR 'B'	XANO INDUSTRI 'B'	NORDEA BANK
KINNEVIK IND. B DEAD - MERGER.679685	JC DEAD - T/O BY 257554	NIBE INDUSTRIER 'B'
MALMBERGS ELEKTRISKA 'B'	KARLSHAMNS DEAD - 14/11/05	NORDNET 'B'
MODERN TIMES GP.MTG 'B'	KABE HUSVAGNAR 'B'	NOLATO 'B'
MUNTERS	KLIPPAN DEAD - 05/05/06	OEM INTERNATIONAL 'B'
NCC 'B'	MALMBERGS ELEKTRISKA 'B'	PEAB 'B'
NORDEA BANK	MEKONOMEN	PROFILGRUPPEN 'B'
NARKES ELECTRISKA DEAD - 03/11/06	MODERN TIMES GP.MTG 'B'	REDERI AB TNSAT.'B'
NEFAB 'B' DEAD - 03/12/07	MUNTERS	ROTTNEROS
NEW WAVE GROUP 'B'	MULTIQ INTERNATIONAL	SAAB 'B'
NIBE INDUSTRIER 'B'	NCC 'B'	SANDVIK
NILORNGRUPPEN 'B' DEAD - 01/07/09	NORDEA BANK	SAS
OEM INTERNATIONAL 'B'	NARKES ELECTRISKA DEAD - 03/11/06	SCA 'B'
OPTIMAIL 'A' DEAD - 24/01/06	NEFAB 'B' DEAD - 03/12/07	SCANIA 'B'
PEAB 'B'	NIBE INDUSTRIER 'B'	SEB 'A'
POOLIA 'B'	NILORNGRUPPEN 'B' DEAD - 01/07/09	SECURITAS 'B'
PROFFICE 'B'	NORDNET 'B'	SEMCON
ROTTNEROS	NOLATO 'B'	SVENSKA HANDBKN.'A'
RORVIK TIMBER	CISION	SKANSKA 'B'
SAAB 'B'	OEM INTERNATIONAL 'B'	SKF 'B'
SALUS ANSVAR 'B'	OPCON	SSAB 'A'
SANDVIK	OPTIMAIL 'A' DEAD - 24/01/06	SVEDBERGS I DALSTORP 'B'
SAPA DEAD - T/O 936884	PARTNERTECH	SWECO 'B'
SARDUS DEAD - 30/04/07	PEAB 'B'	SWEDISH MATCH
SAS	POOLIA 'B'	TICKET TRAVEL DEAD - 12/04/10
SCA 'B'	PROFILGRUPPEN 'B'	TELIASONERA
SCANIA 'B'	REDERI AB TNSAT.'B'	TRELLEBORG 'B'
SKANDIA FORSAKRINGS DEAD - 06/06/06	ROTTNEROS	VBG GROUP
SEB 'A'	SAAB 'B'	VOLVO 'B'
SECURITAS 'B'	SALUS ANSVAR 'B'	BORAS WAFVERI 'B'
SEMCON	SANDVIK	XANO INDUSTRI 'B'
SVENSKA HANDBKN.'A'	SAPA DEAD - T/O 936884	AUDIODEV 'B' DEAD - 18/06/09
SKANSKA 'B'	SARDUS DEAD - 30/04/07	D CARNEGIE & CO DEAD - 24/12/08
SKF 'B'	SAS	NILORNGRUPPEN 'B' DEAD - 01/07/09
SVEDBERGS I DALSTORP 'B'	SCA 'B'	ACSC DEAD - 31/12/07
SWECO 'B'	SCANIA 'B'	BOSS MEDIA DEAD - 21/04/08
SWEDISH MATCH	SKANDIA FORSAKRINGS DEAD - 06/06/06	BROSTROM DEAD - 02/03/09
TICKET TRAVEL DEAD - 12/04/10	SEB 'A'	JC DEAD - T/O BY 257554
TRELLEBORG 'B'	SECURITAS 'B'	KAROLIN MACHINE TOOL DEAD - 0
VBG GROUP	SEMCON	NARKES ELECTRISKA DEAD - 03/11/0
VLT 'B' DEAD - 03/11/08	SVENSKA HANDBKN.'A'	NEFAB 'B' DEAD - 03/12/07
VOLVO 'B'	SKANSKA 'B'	SALUS ANSVAR 'B'
BORAS WAFVERI 'B'	SKF 'B'	SARDUS DEAD - 30/04/07
XPONCARD DEAD - 20/06/08	SSAB 'A'	VLT 'B' DEAD - 03/11/08
	SVEDBERGS I DALSTORP 'B'	XPONCARD DEAD - 20/06/08
	SWECO 'B'	
	SWEDISH MATCH	
	TICKET TRAVEL DEAD - 12/04/10	
	TELIASONERA	
	TRELLEBORG 'B'	
	VBG GROUP	
	VLT 'B' DEAD - 03/11/08	
	VOLVO 'B'	
	BORAS WAFVERI 'B'	
	XPONCARD DEAD - 20/06/08	

Year 2007	Year 2008	Year 2009
ASSA ABLOY 'B'	ASSA ABLOY 'B'	ACAP INVEST
ALFA LAVAL	ALFA LAVAL	ASSA ABLOY 'B'
ACSC DEAD - 31/12/07	AUDIODEV 'B' DEAD - 18/06/09	ALFA LAVAL
ATLAS COPCO 'A'	AVANZA BANK HOLDING	ANOTO GROUP
AUDIODEV 'B' DEAD - 18/06/09	AXFOOD	ATLAS COPCO 'A'
AVANZA BANK HOLDING	BTS GROUP	AVANZA BANK HOLDING
AXFOOD	BALLINGSLOV INTL. DEAD - 13/12/08	AXFOOD
REDERI AB TNSAT.'B'	G & L BEIJER	AXIS
BTS GROUP	BEIJER ALMA 'B'	BTS GROUP
BALLINGSLOV INTL. DEAD - 13/12/08	BEIJER ELECTRONICS	G & L BEIJER
G & L BEIJER	BILIA 'A'	BEIJER ALMA 'B'
BEIJER ALMA 'B'	BILLERUD	BEIJER ELECTRONICS
BEIJER ELECTRONICS	BORAS WAFVERI 'B'	BETSSON 'B'
BILIA 'A'	BROSTROM DEAD - 02/03/09	BILLERUD
BILLERUD	CISION	CISION
BONG	D CARNEGIE & CO DEAD - 24/12/08	CONSILIUM 'B'
BORAS WAFVERI 'B'	DUROC 'B'	DUROC 'B'
BOSS MEDIA DEAD - 21/04/08	ELECTROLUX 'B'	ELECTROLUX 'B'
BROSTROM DEAD - 02/03/09	ELEKTRONIKGRUPPEN BK 'B' DEAD - 28/09/11	ELEKTRONIKGRUPPEN BK 'B' DEAD -
D CARNEGIE & CO DEAD - 24/12/08	ENIRO	ENIRO
DUROC 'B'	ERICSSON 'B'	ERICSSON 'B'
ELECTROLUX 'B'	LAMMHULTS DESIGN GROUP	FAGERHULT
ELEKTRONIKGRUPPEN BK 'B' DEAD - 28/0	FAGERHULT	FENIX OUTDOOR 'B'
ENIRO	FENIX OUTDOOR 'B'	GEVEKO 'B'
ERICSSON 'B'	GEVEKO 'B'	GUNNEBO
LAMMHULTS DESIGN GROUP	GUNNEBO	HL DISPLAY 'B' DEAD - 20/09/10
FAGERHULT	HL DISPLAY 'B' DEAD - 20/09/10	HQ
FENIX OUTDOOR 'B'	HQ	HALDEX
SWEDBANK 'A'	HALDEX	HEXAGON 'B'
GEVEKO 'B'	HOLMEN 'B'	HOLMEN 'B'
GUNNEBO	HOME PROPERTIES DEAD - DEAD 11/05/09	HOME PROPERTIES DEAD - DEAD 11/0
HL DISPLAY 'B' DEAD - 20/09/10	HOGANAS 'B'	HOGANAS 'B'
HQ	INTELLECTA 'B'	ITAB SHOP CONCEPT 'B'
HALDEX	KABE HUSVAGNAR 'B'	INTELLECTA 'B'
HOLMEN 'B'	MALMBERGS ELEKTRISKA 'B'	KABE HUSVAGNAR 'B'
HOGANAS 'B'	MEKONOMEN	LAMMHULTS DESIGN GROUP
XANO INDUSTRI 'B'	MICRONIC MYDATA	MALMBERGS ELEKTRISKA 'B'
KABE HUSVAGNAR 'B'	MODERN TIMES GP.MTG 'B'	MEKONOMEN
KAROLIN MACHINE TOOL DEAD - 04/02/0	MULTIQ INTERNATIONAL	MICRONIC MYDATA
MALMBERGS ELEKTRISKA 'B'	MUNTERS	MODERN TIMES GP.MTG 'B'
MEKONOMEN	NCC 'B'	MULTIQ INTERNATIONAL
MICRONIC MYDATA	NIBE INDUSTRIER 'B'	MUNTERS
MODERN TIMES GP.MTG 'B'	NEONET DEAD - 08/06/10	NCC 'B'
MUNTERS	NEW WAVE GROUP 'B'	NIBE INDUSTRIER 'B'
NCC 'B'	NOBIA	NOTE
NIBE INDUSTRIER 'B'	NOLATO 'B'	NEONET DEAD - 08/06/10
NEFAB 'B' DEAD - 03/12/07	NORDEA BANK	NET INSIGHT 'B'
NEONET DEAD - 08/06/10	NORDNET 'B'	NEW WAVE GROUP 'B'
NEW WAVE GROUP 'B'	OEM INTERNATIONAL 'B'	NOBIA
NILORNGRUPPEN 'B' DEAD - 01/07/09	PARTNERTECH	NOLATO 'B'
NOBIA	PEAB 'B'	NORDNET 'B'
NOLATO 'B'	POOLIA 'B'	OEM INTERNATIONAL 'B'
NORDEA BANK	PROFFICE 'B'	PEAB 'B'
NORDNET 'B'	PROFILGRUPPEN 'B'	PHONERA
OEM INTERNATIONAL 'B'	REDERI AB TNSAT.'B'	POOLIA 'B'
OMX DEAD - 05/05/08	REJLERKONCERNEN	PROFFICE 'B'
CISION	ROTTNEROS	PROFILGRUPPEN 'B'
PARTNERTECH	RORVIK TIMBER	REDERI AB TNSAT.'B'
PEAB 'B'	SAAB 'B'	REJLERKONCERNEN
POOLIA 'B'	SCANIA 'B'	ROTTNEROS
PROFFICE 'B'	SKF 'B'	RORVIK TIMBER
PROFILGRUPPEN 'B'	SWECO 'B'	SAAB 'B'
ROTTNEROS	SANDVIK	SCANIA 'B'
RORVIK TIMBER	SECURITAS 'B'	SKF 'B'
SAAB 'B'	SEB 'A'	SWECO 'B'
SCANIA 'B'	SKANSKA 'B'	SANDVIK
SKF 'B'	STUDSVIK	SECURITAS 'B'
SSAB 'A'	SVEDBERGS I DALSTORP 'B'	SEMCON
SWECO 'B'	SCA 'B'	SENSYS TRAFFIC
SALUS ANSVAR 'B'	SVENSKA HANDBKN.'A'	SKANSKA 'B'
SANDVIK	SWEDBANK 'A'	SVEDBERGS I DALSTORP 'B'
SARDUS DEAD - 30/04/07	TELE2 'B'	SCA 'B'
SECURITAS 'B'	TELIASONERA	SVENSKA HANDBKN.'A'
SEMCON	TICKET TRAVEL DEAD - 12/04/10	TECHNOLOGY NEXUS DEAD - 28/09/09
SEB 'A'	VBG GROUP	TELE2 'B'
SKANSKA 'B'	VOLVO 'B'	TELIASONERA
STUDSVIK	XANO INDUSTRI 'B'	TICKET TRAVEL DEAD - 12/04/10
SVEDBERGS I DALSTORP 'B'		TRANSCOM WWD.SDB.B
SCA 'B'		UNIFLEX 'B'
SVENSKA HANDBKN.'A'		VBG GROUP
TELE2 'B'		VOLVO 'B'
TELIASONERA		XANO INDUSTRI 'B'
TICKET TRAVEL DEAD - 12/04/10		AF 'B'
TRELLEBORG 'B'		
VBG GROUP		
VOLVO 'B'		
XPONCARD DEAD - 20/06/08		

Year 2010	Year 2011
ACAP INVEST	ACAP INVEST
ASSA ABLOY 'B'	ASSA ABLOY 'B'
AARHUSKARLSHAMN	AARHUSKARLSHAMN
ALFA LAVAL	ALFA LAVAL
ATLAS COPCO 'A'	ANOTO GROUP
AVANZA BANK HOLDING	ATLAS COPCO 'A'
AXFOOD	AVANZA BANK HOLDING
BTS GROUP	AXFOOD
BEIJER ALMA 'B'	BE GROUP
BEIJER ELECTRONICS	BTS GROUP
BETSSON 'B'	BEIJER ALMA 'B'
BJORN BORG	BEIJER ELECTRONICS
CONSILIUM 'B'	BETSSON 'B'
DORO	BILIA 'A'
ELECTROLUX 'B'	BJORN BORG
ELEKTRONIKGRUPPEN BK 'B' DEAD - 28/09/11	BONG
ERICSSON 'B'	CONSILIUM 'B'
FAGERHULT	DUROC 'B'
FENIX OUTDOOR 'B'	ELECTRA GRUPPEN
HL DISPLAY 'B' DEAD - 20/09/10	ELECTROLUX 'B'
HQ	ELEKTRONIKGRUPPEN BK 'B' DEAD - 28/09/11
HAKON INVEST	ERICSSON 'B'
HEXAGON 'B'	FAGERHULT
HOLMEN 'B'	FENIX OUTDOOR 'B'
HOGANAS 'B'	HAKON INVEST
ITAB SHOP CONCEPT 'B'	HOLMEN 'B'
INDUTRADE	HOGANAS 'B'
INTELLECTA 'B'	ITAB SHOP CONCEPT 'B'
KABE HUSVAGNAR 'B'	INDUTRADE
LAMMHULTS DESIGN GROUP	INTELLECTA 'B'
MALMBERGS ELEKTRISKA 'B'	KABE HUSVAGNAR 'B'
MEKONOMEN	LAMMHULTS DESIGN GROUP
MICRONIC MYDATA	LINDAB INTERNATIONAL
MODERN TIMES GP.MTG 'B'	MALMBERGS ELEKTRISKA 'B'
MULTIQ INTERNATIONAL	MODERN TIMES GP.MTG 'B'
MUNTERS	MULTIQ INTERNATIONAL
NCC 'B'	NCC 'B'
NIBE INDUSTRIER 'B'	NIBE INDUSTRIER 'B'
NOTE	NET INSIGHT 'B'
NEONET DEAD - 08/06/10	NEW WAVE GROUP 'B'
NET INSIGHT 'B'	NOBIA
NEW WAVE GROUP 'B'	NOLATO 'B'
NOBIA	NORDNET 'B'
NOLATO 'B'	OEM INTERNATIONAL 'B'
NORDNET 'B'	PARTNERTECH
OEM INTERNATIONAL 'B'	PEAB 'B'
PARTNERTECH	PHONERA
PEAB 'B'	PRICER 'B'
PHONERA	PROFFICE 'B'
POOLIA 'B'	PROFILGRUPPEN 'B'
PROFFICE 'B'	REJLERKONCERNEN
PROFILGRUPPEN 'B'	REZIDOR HOTEL GROUP
REDERI AB TNSAT.'B'	SCANIA 'B'
REJLERKONCERNEN	SKF 'B'
SCANIA 'B'	SWECO 'B'
SKF 'B'	SANDVIK
SSAB 'A'	SECURITAS 'B'
SWECO 'B'	SEMCON
SANDVIK	SKANSKA 'B'
SECURITAS 'B'	STUDSVIK
SEMCON	SVEDBERGS I DALSTORP 'B'
SENSYS TRAFFIC	SCA 'B'
SKANSKA 'B'	SVENSKA HANDBKN.'A'
STUDSVIK	SWEDOL 'B'
SVEDBERGS I DALSTORP 'B'	TELE2 'B'
SCA 'B'	TELIASONERA
SVENSKA HANDBKN.'A'	UNIFLEX 'B'
TELE2 'B'	VBG GROUP
TELIASONERA	VOLVO 'B'
VBG GROUP	XANO INDUSTRI 'B'
VOLVO 'B'	AF 'B'
XANO INDUSTRI 'B'	
AF 'B'	