# The Relevance of Earnings and Cash Flows Measures in Explaining Security Returns over Long Intervals: Evidence from Sweden

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**Abstract**

This study intends to provide an increased understanding of the process connecting security returns, earnings and cash flows by focusing on the long return period effect on this return-earnings/cash flow association. The research is based on the Swedish data relating to the listed Swedish companies over 1998-2009. The study takes a statistical approach and invokes econometrical modelling to answer which accounting measures are the most relevant for explaining stock returns in Swedish companies over time intervals of varying lengths. The reporting environment in Sweden indicates the usefulness of both accounting measures; however, the empirical research from other countries provides mixed evidence about value relevance of earnings and cash flows. The empirical results of this study find that earnings are relatively more informative than various cash flow measures in explaining stock returns over both short and long measurement intervals. However, cash flow measures provide incremental information content beyond earnings throughout long and short measurement intervals. This especially holds when investigating disaggregated cash flows. The findings confirm that the two significant summary measures (earnings and cash flows) of company performance have value relevance and could be of interest to international investors attracted in investing in Swedish stocks.

**Keywords**: *earnings, cash flows, long intervals, relative and incremental information content, value relevance*

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# Contents

# 1 Introduction

Active stock investors turn to financial analysis to determine the fundamental value of companies. They seek to know what the company's worth is so that they could assess the respective stock prices. As a matter of fact, one of the major objectives in financial reporting is to provide equity investors with information relevant for estimating value of a firm (Beisland, 2009). Research related to "value relevance" of accounting statements empirically investigates whether this objective is met. Are accounting numbers invoked as a source of useful information when evaluating company performance as reflected in stock prices? An extensive amount of literature tries to answer a great number of dimensions of this question. Such empirical research on the associations between capital markets and financial statements is referred to as market-based accounting research (Beisland, 2009).

This study is concerned with the aspect of value relevance of earnings and cash flow measures, i.e. how accounting measures influence the change in the market value of equity (also known as stock return). The accounting metric that received most interest in research is "bottom-line earnings" which is an important summary measure of company performance used by a wide range of users. For instance, earnings are used to evaluate and reward management, in debt covenants and when companies seek to go public, and also by capital providers (investors and creditors) (Dechow, 1994). Earnings are produced as one of the key measures under the accrual basis of accounting[1]. Accruals are generally viewed as items that improve the ability of earnings to accurately reflect company performance, but in the end what matters is the company's capacity to generate cash inflows that are above the cash disbursements. Also a multitude of valuation models from theory uses the present value of cash flows or dividends as indicators of a company value. Therefore, realized cash flows can also be used as a performance measure. Cash flows are a component of earnings[2] and play an important role in the valuation process (Charitou & Ketz, 1990); however, over finite reporting intervals cash flows are not essentially informative. This is because cash flows are not indicative of business transactions that do not involve payments and take place within the generally accepted reporting periods (e.g. one year). Due to the fact that cash flows contain these "timing and matching" problems, the accounting reporting principles are focused on

[1] Accrual accounting is a common term that refers to a method when the performance and position of a company are measured by recognizing economic events related to company's business regardless of when cash transactions occur (see accounting literature)

[2] Earnings generally viewed is the aggregate of cash flows and accruals (earnings = cash flows + accruals)

using accruals to enhance the cash flows representation in earnings. It is expressed by IASB in IAS Framework 2009: "Financial statements prepared on the accrual basis [...] provide the type of information about past transactions and other events that is most useful to users in making economic decisions."

However, management typically has some discretion over the recognition of accruals (Dechow, 1994). Besides that, Easton et al. (1992) indicate that over shorter reporting periods value relevant events might get recorded in the "wrong period." All this undermines reliability of earnings, as a signal about company performance. The concept of opportunistically manipulated accruals drives empirical research forward because there is uncertainty as to whether accruals improve or reduce the ability of earnings serve as the best summary gauge of company performance. The prior research also provides mixed or inconclusive evidence (see chapter 2. Previous Research) with respect to which accounting measure is *relatively* superior as a source of information in value relevance. However, the IASB in IAS7 stipulates that cash flows are useful in providing company performance related information and "when used *in conjunction*[3] with the rest of the financial statements, provides information that enables users to evaluate the changes in net assets of an entity, its... liquidity and solvency and its ability to affect the amounts and timing of cash flows..." This points to the fact that cash flow data might have *incremental* information content for security returns, given earnings, and has been under extensive research as well. Nevertheless, empirical findings in this vein have also proved to be mixed (Charitou & Clubb, 1999). If we look at the longer finite measurement periods, cash flows will suffer from fewer timing and matching problems, as the importance of accruals diminishes. Therefore, over longer measurement windows, earnings and cash flows are expected to converge as measures of company performance (clean surplus assumed) (Dechow, 1994).

Keeping the above considerations in mind, with the subsequent research we try to answer the question:

*Which accounting measures are the most relevant for explaining stock returns in Swedish listed companies over time intervals of various lengths?*

This study has the aim to provide a fuller understanding of the process linking the security returns, cash flows and earnings by focusing on the impact of long return intervals on the

[3] Emphasis added

security return–earnings/cash flow association. The main results of research in the United States (US)[4] are: (i) cash flows have incremental information content for stock returns, (ii) the explanatory power of earnings is superior to that of cash flows, (iii) there is stronger association between the contemporaneous stock return earnings/cash flows over long return periods. These results provide a firm ground to start from, however their generalization to Sweden is an empirical matter.

## 1.1 Contribution

The paper aims to contribute to the existing research in three ways. Firstly, no prior study has compared the information content of Swedish earnings and cash flows to such extent. This is important since in the wake of increased international trade and relations with other countries, investors and users of financial information outside Sweden might be seeking information content of Swedish earnings and cash flows. Secondly, the case of Sweden constitutes a unique empirical context for evaluating the information content of Swedish earnings and cash flows and thus the exact findings cannot be single-handedly implied without in-depth research. Unlike the US which has a dispersed ownership structure, Sweden is characterised by having an environment where companies have concentrated ownership structure (Eklund et al., 2009). "In such an environment there is a huge risk that controlling shareholders may mistreat or expropriate minority shareholders by engaging in earnings management activities among others." (Habib, 2008) This situation then weakens the earnings–contemporaneous security return association, as accounting earnings are of lower quality. Hellman (2011) also indicated that during 1991-2004 (which was the period of voluntary adoption of IFRS in Sweden) companies on average "used the flexibility offered by the soft adoption regime to manage earnings." This time period intersects with the period our study investigates. However, it is difficult to presume that the information contained in the Swedish earnings numbers has weaker explanatory power than in other jurisdictions as companies of Scandinavian legal origin ranked lowest on earnings management (Hellman, 2011). With regards to the cash flows, they have always been an integral part of Swedish financial statements and IFRS (adopted in 2005) more favour the direct method cash flow format[5]. Krishnan and Largay (2000) points out that direct method information has a higher predictive

[4] This is the summary of the results drawn from the findings of the studies described in the Previous Research chapter

[5] Even though IASB allows both direct and indirect cash flow calculation methods, "entities are encouraged to report cash flows from operating activities using the direct method" (IAS7)

ability than indirect method information. This result may make cash flow information more relevant in explaining stock return, but flexibility permitted by IFRS does not necessarily mean that better quality cash flows are the case in Swedish financial reporting. Thirdly, in our study we employ the flow to equity measure and explore its association with the stock return. Similar variable was used in the Charitou & Clubb (1999) study; however, they invoke slightly different methodology of researching the value relevance of this metric. We believe that it is reasonable to include the flow to equity measure in our analysis because it is used in valuation theory.

Based on Swedish data, the empirical results of this study find that earnings are relatively more informative than various cash flow measures in explaining stock returns over both short and long measurement intervals. However, cash flow measures provide incremental information content beyond earnings throughout long and short measurement intervals. This especially holds when investigating disaggregated cash flows. These findings confirm that the two significant summary measures (earnings and cash flows) of company performance are important in valuation.

The remainder of the paper is organized as follows: Chapter 2 reviews the previous literature related to the topic under investigation. Chapter 3 lays the theoretical foundation for the subsequent analysis regarding the relation between the accounting numbers and security returns. It also describes the variables. In Chapter 4, the research hypotheses are developed. Chapter 5 presents methodological approach by outlining regression models used in the study. Chapter 6 elaborates on the data description, sample selection, descriptive statistics collinearity diagnostics and regression model testing. Chapter 7 presents empirical findings and relates them to hypotheses. In Chapter 8, the results are summarized. The final Chapter 9 reveals limitations of the current study and suggests avenues for further research.

# 2 Previous Research

The following literature overview gives insights into the research previously conducted in the field. Since, none of such studies were performed on the Swedish data in the international arena, prior research is investigated in detail to provide understanding of where to start such kind of research. We tend focus on the fundamental and most renowned studies written.

## 2.1 Earnings Relevance in Security Valuation: Earnings is a Dominant Variable in the Marketplace

The reasonable outset of our analysis could be considered the Easton and Harris (1991) study which investigates if the accounting earnings variable is relevant for evaluating earnings-returns associations. The primary idea on which this research rests is that book value and the market value of owners' equity are both "stock" variables indicating the wealth of the firm's equity holders. Being among few authors who base their model on this kind of idea, Easton and Harris prove the importance of earnings variables (current earnings level and the earnings change variables) in security valuation. This is achieved by including both "level" and "change" types of variables in the same regression and taking them as independent variables against the raw returns which is the dependent variable. Such empirical analysis runs contrary to much of the empirical literature which considers the relation between unexpected (abnormal) returns and unexpected earnings. But by taking this kind of road, Easton and Harris blend in the huge body of research which tries to improve the "reputation" of the earnings ability to explain stock returns after the renowned study of Lev (1989) that expressed a concern about the pervasiveness of low R-squared statistics in the studies that associate earnings with security returns.

Thus by taking a closer look at the Lev's work, we can get an idea on how the research on returns-earnings association progressed since late 1960s till late 1980s. Lev made one of the rare attempts to summarize what had been done within the past 20 years to understand the usefulness of earnings. Commencing the assessment of the usefulness of earnings to investors with pioneering returns-earnings studies of Ball and Brown (1968) and Beaver (1968), the author concludes that "while earnings appear to be used by investors, the extent of earnings usefulness is rather limited." This was indicated by a very unstable correlation between earnings and stock returns and by the very slim contribution of earnings to the prediction of stock prices and returns. The low quality (information content) of reported earnings was claimed to be due to biases ingrained in accounting measurement and valuation principles at that time and sometimes due to managers' manipulations of reported numbers. To this end, Lev proposes improvements in accounting measurement and valuation techniques which affect the ability of earnings and other financial items to facilitate the prediction of investor cash flows. However, we tend to focus on the more technical contribution of his study. Lev

proposes that inclusion of earnings levels variables (besides the earnings changes variables) in the regression analysis improves the overall explanatory power of earnings.

The issue of earnings explanatory power can be mitigated more effectively by focusing on fundamental attributes of accounting, i.e. the levels variables of earnings (as it was also recommended by Lev (1989) above). For instance, since the level of earnings is used as an explanatory variable for returns, measurement of earnings expectations are not needed. In addition, Easton et al. (1992) consider long return periods, which help avoid even more errors. In particular, most value-relevant events occurring during a specific time interval should be part of the contemporaneous earnings, if the interval of analysis is sufficiently long. Since earnings aggregate over time periods, it makes no difference in which subperiod of the interval under consideration the value-relevant events are recognized as earnings. To put it a different way, it means that two kinds of errors ("(i) value-relevant events occurring during the return interval which are recognized in earnings of subsequent periods, and (ii) value-relevant events occurring prior to the return interval which are recognized in earnings during the interval.") are accounted for, because by choosing a long period of analysis, these errors become rather unimportant in comparison to the effects due to the value-relevant event that are "correctly" recognized during the interval under investigation. Therefore, viewed in a simple way, if a firm whose life (from creation to liquidation) perfectly matches the event window, then logically there are no errors in the firm's life-time earnings. Easton et al. (1992) further states that by invoking this kind of theoretical benchmark, "returns-earnings relation yields impressive and consistent results." Empirically, for a ten-year return period, the returns and earnings variables give a higher R-squared measure than for a five-year return interval. As expected, for two- and one-year return periods, the R-squared measures are even smaller. In this respect, the Easton's study relates to the abovementioned Lev's (1989) analysis in which he reports that correlations between earnings and returns are indeed higher for longer return periods. Easton et al. (1992) is one of the first theoretical studies that demonstrated why returns and earnings "should be almost perfectly correlated for sufficiently long return intervals." By showing that the correlation between earnings and returns improves with increases in the return interval, the study does not intend to suggest that long return intervals are "superior or more logical than shorter ones", but by having this "high R-squared setting" in the analysis it is "easier to conceptualize and test for the effects of variables potentially relevant in explaining the dependent variable." Thus we take a note of this conclusion in our own analysis.

Another anchor study with regards to the explanatory power of earnings for stock returns is the one by Strong and Walker (1993). The motivation of their study again stems from the Lev's (1989) work which concluded that explanatory value of earnings for stock returns, and therefore the usefulness of earnings disclosures, "tends to be embarrassingly low." The authors claim that a more general specification of the returns-earnings relation can decrease the poor informational properties (quality) of reported earnings coming from biases encouraged by accounting measurement practices or arbitrary management of earnings measurement process. To be specific, if "(i) contemporaneous earnings yield is included in addition to the deflated first difference in earnings that is normally included in models of the returns-earnings relation; (ii) regression parameters are allowed to vary both cross-sectionally and over time; (iii) parameter values are allowed to vary across components of earnings to distinguish extraordinary and exceptional items from the other components of earnings," then all the methodological features altogether contributes significantly to the earnings ability to explain security price changes.

In sum, the above studies focus on highlighting the relevance and importance of earnings variables in security valuation. By considering the above cloud of literature, we can conclude that earnings ("the bottom line") are widely believed to be the "premier information item provided in financial statements" that have a role of a signal optimally guiding resource allocation in capital markets (Lev (1989)). Thus, accounting earnings are used as a source of information by investors. Besides that, even if earnings-relation associations were documented to have weaknesses, they can be mitigated by invoking specific methodological or statistical techniques. The subsequent section will review the body of research that speaks in favour of cash flow variables instead or as providing incremental explanatory power on top of earnings variables.

## 2.2 Earnings versus Cash Flows: Which of the Measures is Superior? Research on the Relative and Incremental Information Content

Drawing on Easton et al. (1992), who show that the association between earnings and stock returns improves over longer measurement intervals, we gain insight that this result is consistent with the fact that earnings "measurement error" is decreased as measurement interval is expanded. But do realized cash flows suffer less than earnings in this respect? One of the "big references" in the accounting literature, the Dechow's (1994) study, answers this negatively and investigates circumstances under which accruals play an important role in

measuring firm performance and mitigate temporary matching and timing problems ingrained in cash flows.

As a starting point, Dechow (1994) states that the information asymmetries between management and other parties create a need for an internally generated measure of firm performance to be reported over finite intervals. She suggests that since the main goal of a company is to generate cash flows, then the net cash receipts (realized cash flows) could serve as one measure for performance. However, the issue being raised is that over restricted intervals, reporting realized cash flow is not necessarily informative, because cash flows have timing and matching problems, which makes them a "noisy" indicator. Dechow (1994) suggests that to mitigate these problems, accruals could be used to alter the timing of cash flows recognition in earnings. At the same time, though, accruals raise other issues. Namely, if management uses their discretion to opportunistically manipulate accruals, then earnings might be less reliable and information relevant, in which case cash flows would be the preferred method. In her study, Dechow examines whether accruals improve the information content of earnings for firm performance, by comparing the information content of accounting earnings (including accruals), operating cash flows and net cash flows. So, the objective of the paper was to evaluate which performance measure (realized cash flows or earnings) relatively better summarizes firm performance as reflected in stock returns.

Dechow (1994) demonstrates that one role of accounting accruals is to provide a measure of short-term performance that more closely reflects expected cash flows than do realized cash flows. The conclusion of her study is that over short measurement intervals earnings are more strongly associated with stock returns than are operating and net cash flows. Furthermore, the ability of cash flows to measure firm performance improves relative to earnings as the measurement interval is lengthened. The paper adds to previous research by documenting the benefits of accrual accounting compared to "primitive" cash accounting and shows why earnings are the preferred measure reported to investors, and that the value added by accountants is in accruing cash receipts and payments as to attain a more useful measure of short-term firm performance.

A potential drawback of the Dechow (1994) study is that it treats accounting earnings (including accruals) and cash flows as two measurement indicators that are considered in isolation, i.e. measuring only relative superiority one or another accounting measure. Charitou and Clubb (1999) acknowledge this in their study of the relative and incremental

informative value of accounting earnings and cash flows for security returns. Their reading builds on previous US research which provides empirical support for positive relation between returns and accounting earnings over long term, but which provides limited evidence for relation between returns and cash flows over long intervals (Easton et al. (1992); Ohlson and Penman (1992); Warfield and Wild (1992); and Dechow (1994)). They state that empirical studies suggest that security returns are much more closely connected to earnings than to cash flows. At the same time, nonetheless, they pinpoint that a number of studies on US data also provide support to the hypothesis that cash flows have explanatory value for returns (Rayburn (1986); Wilson (1986 and 1987); Bowen et al. (1986); Charitou and Ketz (1991); Livnat and Zarowin (1990)). This hypothesis is also supported by studies using UK data by Ali and Pope (1995) and Clubb (1995).

As concluded by Jennings (1990), little evidence of incremental information content for cash flows beyond earnings emerged from US studies published in the 1980s, while the UK study by Board and Day (1989) also found no support for the incremental information of operating cash flow. Subsequent studies by Charitou and Ketz (1991) and Ali (1994) in the US and Ali and Pope (1995), Clubb (1995) and McLeay et al. (1997) in the UK provided some evidence of incremental information content for cash flows, although US studies by Livnat and Zarowin (1990), Charitou and Ketz (1990) and Bernard and Stober (1989), were unable to show that cash flows and accruals are valued differently in the marketplace.

Therefore, looking at the bigger picture the results of the studies examining the incremental information content of cash flows beyond earnings have been inconclusive. Based on this, Charitou and Clubb (1999) explain their interest in a long return interval analysis of the relation between security returns and earnings and cash flows for the UK data. They indicated that over longer measurement intervals, operating cash flows overcome some of the timing and matching problems, therefore the importance of accruals decreases, and accounting earnings and cash flows show some convergence as indicators of firm performance. The main intent of Charitou and Clubb (1999) was to provide an increased understanding of the process connecting security returns, earnings and cash flow by focusing on the long return period effect on the association between security returns and cash flow and earnings measures. Their paper adds to previous research in three major aspects. First, they provide a theoretical basis for empirical analysis of the relationship between security returns and cash flow data over long return intervals. Second, they extended previous univariate analysis of earnings and cash flow data over long return intervals by carrying out multivariate analyses of both the

information content of cash flow variables and the incremental information content of accounting earnings and cash flows. And third, they broadened the long-return interval analysis of earnings and cash flows to a non-US setting by analyzing UK data over the period 1985-92. The empirical findings of Charitou and Clubb (1999) demonstrate that multivariate cash flow analysis over long return intervals results in higher explanatory power for returns (than in a univariate approach) and that large increases in explanatory power can occur by supplementing cash flow numbers to accounting earnings as explanatory variables for long-interval stock returns.

The Charitou and Clubb (1999) work presented strong evidence of the valuation relevance of cash flow information and thus is considered to be another strong benchmark study in the research field. They showed that while cash flow from operations and change in cash have less explanatory value for security returns than accounting earnings over one-, two- and four-year return intervals, the relative performance of the cash flow variables improves with the increase in the measurement period. Moreover, their study provides strong confirmation of continued incremental information value of cash flow measures beyond accounting earnings, as the return interval increases.

## 2.3 Beyond the 1990s and the US and UK research

Most of research in the 1990s was performed on the US and UK data. Even though the value relevance of earnings and cash flows remain topical in those markets, in the later years there has been increased research interest in this area for other countries. In the following paragraphs we will present several papers that analyze the information value of accounting earnings and cash flow measures for security returns in different jurisdictions and finish with highlights from the Penman's and Yehuda's study from 2009.

Bartov et al. (2001) investigated the relative and incremental abilities of cash flows and earnings to explain equity valuation within the United States, the United Kingdom, Canada, Germany and Japan. The findings of the study support that earnings have greater explanatory value than cash flows in the "Anglo-Saxon samples": US, UK, and Canada, but not in the non-Anglo-Saxon samples of Germany and Japan ("consolidated[6]"). Also, the incremental explanatory value of earnings over cash flows is greater for the Anglo-Saxon samples as compared to the non-Anglo-Saxon samples. The difference between the two groups occurs

[6] Bartov reports different findings depending on whether parent company's or consolidated financial statements are analysed

primarily because financial reporting rules are heavily influenced by the way in which capital is traditionally raised. In countries where capital is raised in public capital markets (Anglo-Saxon), the objectives of financial reporting are related more to the requirements of the equity investors. In countries where capital is traditionally raised from private sources (e.g. Germany, Japan), the objectives of financial reporting are closely connected to the requirements of creditors and tax authorities. This study makes an important contribution by demonstrating that the superiority of earnings over cash flows is not universal, but rather dependant on the national reporting regime and socio-economic environment.

The main focus of our thesis is not on institutional differences on the quality of accounting information, but we found it relevant to look into what other the findings regarding earnings-cash flows-returns associations across different legal systems are. Conclusions from that research might help explain different results that we might get for Sweden. For instance, research in the US suggests that incremental information content of earnings and cash flows is significantly affected by contextual firm-specific factors (Saeedi and Ebrahimi (2010)). Thus if our final results do not demonstrate significance or are weak, we might be motivated to look into the country specific factors that affect the relationship between the variables. Current research regarding institutional differences on the informativeness of accounting information reveals that common law countries provide better quality accounting information than their code-law counterparts (Ball et al., 2000; Bushman and Piotroski, 2006). However, common law countries differ among themselves and investors thus need to consider the country-specific institutional setting before making investment decisions. Below we briefly introduce studies that are present results with regards to our research area in different jurisdictions (code-law, common law, Islamic law countries).

Habib's (2008) research in New Zealand also empirically examined the relative and incremental information content of earnings and cash flows. But in addition he considered "the role of firm-specific contextual factors in moderating information content in New Zealand." The results offer evidence that both earnings and cash flows are value-relevant in New Zealand. Moreover, both earnings and cash flows have incremental information content with respect to security returns. This finding could be ascribed to the "value-enhancing role that dominant owners play in such an environment."

Plenborg's (1998) study blends in well with the findings in other research as it finds accrual-based earnings superior to cash flow measures in explaining security returns and proves that

aggregated effect of cash flows carries incremental information content beyond earnings. In addition, Plenborg tests the explanatory power of independent variables in different length of (returns) measurement window. The results confirm the findings of Dechow (1994) who claimed that earnings variables remain relatively more informative than the cash flow variables when increasing the length of the operation cycle. From a policy perspective, these findings support that the cash flow statement is a useful part of Danish financial statements. Compared with previous cash flow studies using data from other countries, this study shows that it is useful to examine the information content of cash flow variables other than just cash flow from operations. This work was the first attempt to look into the comparative information content of Danish earnings and cash flows and for this reason it becomes particularly interesting for us, because, to our best knowledge, this has not been researched in Sweden yet.

In conclusion, it seems that the question of which accounting measure is superior in explaining stock returns is pretty much researched, at least judging by the number of studies produced on the topic. However, Penman and Yehuda (2009) performed a study on the quite recent US data including a long time span (1963-2001) and concluded that under accrual accounting principles superiority of accrual accounting favouring earnings in equity valuation. Free cash flows (net cash flow from a business) are cash distributions like dividends and "just as dividends do not affect the cum-dividend value of equity, free cash flows do not affect the cum-dividend value of operations, nor the value of equity." This finding is in line with what Charitou and Clubb (1999) discovered about their measure of free cash flow. But Penman and Yehuda (2009) indicates that when free cash flow is split into cash investment and cash from operations, it provides incremental information for valuation. Thus, such considerations provide some guidance on how to approach the value relevance issues.

# 3 The Relation between Accounting Numbers and Security Returns

Relating accounting variables with security valuation has been a challenge for accounting researchers and financial analysts over the years. The choice of relevant accounting numbers and the specification of the relation between these numbers and security prices have been important issues. A number of valuation models have been proposed over time, ranging from

models based on statistical association of accounting numbers and security prices, to models that are derived from the theory of capital value (Skogsvik, 2002).

The statistical valuation models are based on simplified assumptions about the relation between accounting numbers and security prices (e.g. valuing the security using a P/E multiple). The security price is determined based on observed empirical market data, thus assuming that the securities are correctly priced in the market (market is efficient in a semi-strong from, i.e. all public information is entirely reflected in market prices). The derived valuation models do not depend on the assumptions of market efficiency, and, in general, provide a good basis for the relationship between accounting variables and security prices.

In the following sections we will analyse the relationship between accounting variables and security prices provided by these two types of models.

## 3.1 Relating Accounting Earnings to Valuation Models Based on Capital Value Theory

To illustrate the relation between derived valuation models and accounting numbers, we will use the examples of the Present Value of Expected Dividends (PVED) and the Residual Income Valuation (RIV) models.

The theory of capital value states that current value is equal to the present value of future cash flows. Thus the current market value of the owners' equity is equal to the present value of expected future dividends:

$$P_0 = \sum_{t=1}^{\infty} \frac{d_t}{(1+r_e)^t} \qquad (1)$$

Where $P_0$ is the current share price

$d_t$ is net dividends (dividends less new equity capital issued) at time $t$

$r_e$ is the required rate of return on equity

This valuation function assumes an infinite time of life for the company.

Now let us consider the clean surplus relation of accounting:

$$d_t = BV_{t-1} + AE_t - BV_t \qquad (2)$$

Where $AE_t$ is accounting earnings for the period ($t$-1,$t$)

$d_t$ is net dividends paid over the period ($t$-1,$t$)

$BV_t$ is the book value of equity at time $t$

The clean surplus relation implies that the net dividends paid in a period are equal to the difference between the accounting earnings and the change in the book value of equity during the period. The accounting earnings can be written as $AE_t = BV_{t-1} * ROE_t$.The difference between the actual accounting return on owners' equity and the required rate of return $(r_e - ROE_t)$ can be considered as residual income. Rewriting $ROE_t = r_e + (ROE_t - r_e)$ and restating (2) yields:

$$d_t = BV_{t-1} * [r_e + (ROE_t - r_e)] - (BV_t - BV_{t-1})$$

or

$$d_t = BV_{t-1} * (1 + r_e) + BV_{t-1} * (ROE_t - r_e) - BV_t \qquad (3)$$

Substituting (3) into (1), we obtain[7]:

$$P_0 = BV_0 + \sum_{t=1}^{\infty} \frac{BV_{t-1} * (ROE_t - r_e)}{(1+r_e)^t} \qquad (4)$$

Therefore, we can conclude that the current market value of a security is given by:

- The book value of owners equity
- The present value of expected future residual income.

Taking into account the Residual Income valuation expression (4), we see that there is a direct relation between the book value of owners' equity, and the security price. Both the book value and the market value of owner's equity are proxies for the wealth of the shareholders. This can be illustrated in the following expression (Easton & Harris, 1991):

$$P_t = BV_t + G_t \qquad (5)$$

Where $P_t$ is the share price at time $t$

[7] This expression is based on the assumption in Ohlson (1995) that $BV_t * (1 + r_e)^{-t} \to 0$ as $t \to \infty$

$BV_t$ is the book value per share at time *t*

$G_t$ – goodwill, is equal to the difference between $P_t$ and $BV_t$ and results from information included in the price, but not yet observable in the accounting variables.

The relation between the change in share price and the change in book value (the flow variables) can be expressed as:

$$\Delta P_t = \Delta BV_t + \Delta G_t \qquad (6)$$

Where $\Delta P_t = P_t - P_{t-1}$

$\Delta BV_t = BV_t - BV_{t-1}$

At the same time, using the clean surplus relation, the change in book value of owners' equity can be expressed as:

$$\Delta BV_t = AE_t - d_t \qquad (7)$$

Where $AE_t$ is accounting earnings for the period (*t*-1,*t*)

$d_t$ is net dividends paid over the period (*t*-1,*t*)

Substituting (7) into (6) yields:

$$\Delta P_t = AE_t - d_t + \Delta G_t$$

or

$$P_t - P_{t-1} + d_t = AE_t + \Delta G_t \qquad (8)$$

Deflating (8) by the beginning of the period price ($P_{t-1}$), we obtain:

$$\frac{P_t - P_{t-1} + d_t}{P_{t-1}} = \frac{AE_t}{P_{t-1}} + \frac{\Delta G_t}{P_{t-1}} \qquad (9)$$

Thus, there is clear indication that accounting earnings divided by the share price at the beginning of the period should have an explanatory value for the explaining security returns.

## 3.2 Relating Accounting Earnings to Statistical Valuation Models

In the previous section we have derived the relation between accounting numbers and security returns using valuation models based on the theory of capital value. In this section we will evaluate the same relationship using a statistical valuation model based on earnings. This model estimates the price of a security as a multiple of earnings (Easton & Harris, 1991):

$$P_t = m * AE_t + v_t \qquad (10)$$

The multiple $m$ is often assumed constant across companies and across time (Easton & Harris, 1991). In line with the Miller & Modigliani (1961)[8] dividend irrelevance proposition, if there is a payment of dividends at time $t$, equation (10) becomes:

$$P_t + d_t = m * AE_t + e_t \qquad (11)$$

Dividing (11) by $P_{t-1}$ and subtracting 1 from each side, we obtain:

$$\frac{P_t + d_t - P_{t-1}}{P_{t-1}} = m * \frac{AE_t}{P_{t-1}} + e_t' \qquad (12)$$

Again, this suggests accounting earnings divided by the price at the beginning of the period are associated with security returns.

Easton and Harris (1991) also demonstrate that there is a linear association between change in earnings divided by the price at the beginning of the period and the security returns over the same period[9].

## 3.3 Relating Accounting Earnings and Long Interval Security Returns

In the spirit of Charitou & Clubb (1999) and Easton et al. (1992), we illustrate that the security return over a period is equal to the sum of clean surplus earnings over that period and the change in goodwill over the same interval, divided by the security price at the beginning of the period (where goodwill is the difference between market value and book value of equity).

$$P_T - P_0 = (BV_T - BV_0) + (G_T - G_0) \qquad (13)$$

[8] Cited in Easton & Harris (1991)

[9] Easton & Harris use equation (11) to show that $\frac{\Delta P_t + d_t}{P_{t-1}} = m * \frac{\Delta AE_t}{P_{t-1}} + e_t''$

Taking into account the clean surplus relation (7), we can write:

$$(BV_T - BV_0) = \sum_{t=1}^{T} AE_t - \sum_{t=1}^{T} d_t \qquad (14)$$

Substituting (14) in (13), yields:

$$\Delta P_T + \sum_{t=1}^{T} d_t = \sum_{t=1}^{T} AE_t + \Delta G_T \qquad (15)$$

Assuming that dividends are invested in risk-free assets[10] ($r_f$), and deflating expression (15) by the price at the beginning of the period, we can obtain:

$$(\Delta P_T + Cd_T + Z_T)/P_0 = (CAE_T + Z_T)/P_0 + \Delta G_T/P_0 \qquad (16)$$

Where $Cd_T$ is cumulated dividends over the period (0, T)

$CAE_T$ is cumulated accounting earnings over the period (0, T)

$Z_T = \sum_{t=1}^{T-1}[d_t * ({R_f}^{T-t} - 1)]$ is the return of the dividends invested in risk-free assets

$R_f = r_f + 1$

$\Delta G_T = (P_T - BV_T) - (P_0 - BV_0)$ is the change in goodwill for the period (0,T)

The change in goodwill is perceived as a "measurement error" in aggregate earnings in relation to security returns (Easton et al, 1992). This measurement error is expected to be overwhelmed by the variation of the earnings variable. The decrease in the significance of this term over long periods is evident in Ohlson (1995), who suggests that as $T \to \infty$, the value of $P_0$ can be written as:

$$P_0 \approx \frac{E_0[\sum_{t=1}^{T} AE_t + \sum_{t=1}^{T} d_t({R_f}^{T-t} - 1)]}{({R_f}^{T} - 1)} = E_0[CAE_T + Z_T]/\left({R_f}^{T} - 1\right) \qquad (17)$$

Where $E_0$ denotes the expected value at time 0. Assuming investor risk neutrality, the security return over the period (0, T), as $T \to \infty$, can be expressed as:

$$\left({R_f}^{T} - 1\right) \approx E_0[CAE_T + Z_T]/P_0 \qquad (18)$$

This means that the expected security return tends towards cumulated earnings, including expected earnings on investing dividends in risk free assets, divided by the security price at

[10] Same assumption is considered in Charitou & Clubb (1999), Easton et al. (1992)

the beginning of the period. Therefore, there is a clear indication that earnings cumulated over longer intervals provide improved explanatory power for security returns, consistent with previous empirical findings.

## 3.4 Relating Cash Flows and Security Returns

Consistent with the previous sections, we express the market value of equity as cash book value of equity plus cash goodwill, where cash book value of equity is the difference between Cash and Loan capital at date t, and cash goodwill is the difference between market value and cash book value of equity (Charitou & Clubb, 1999):

$$P_t = CBV_t + CG_t$$

Where $CBV_t = C_t - L_t$ is cash book value of equity at time t

$CG_t = P_t - CBV_t$ is the cash goodwill

The flow variables related to cash book value and market value would then be:

$$\Delta P_t = \Delta CBV_t + \Delta CG_t = \Delta C_t - \Delta L_t + \Delta CG_t \qquad (19)$$

Adding the net cash dividends to each side of expression (19), and dividing by the price at the beginning of the period, we get:

$$\frac{(\Delta P_t + d_t)}{P_{t-1}} = \frac{(\Delta C_t - \Delta L_t + d_t)}{P_{t-1}} + \frac{\Delta CG_t}{P_{t-1}}$$

Taking into account that

$$NCF_t = CFO - CFI + \Delta L_t - d_t$$

we can define a measure of ***cash earnings*** that fulfil the basic requirement of the clean surplus relation (i.e. that cash earnings equals the change in cash book value of equity plus net dividends):

$$CE_t = CFO_t - CFI_t = \Delta C_t - \Delta L_t + d_t$$

So the following relation between security returns and cash earnings results:

$$\frac{(\Delta P_t + d_t)}{P_{t-1}} = \frac{CE_t}{P_{t-1}} + \frac{\Delta CG_t}{P_{t-1}} \qquad (20)$$

Expression (20) indicates that cash earnings, deflated by the price at the beginning of the period, are associated with security returns. Since the cash earnings is a clean surplus concept, then, in line with proposition 5 in Ohlson (1995), the capitalization of aggregate Cash earnings over an infinite period yields the market value of equity (Charitou & Clubb, 1999). This means that like any clean surplus earnings measure, cash earnings should be highly associated with security returns over longer periods.

## 3.5 Multivariate Analysis of Security Returns, Cash Flows and Accounting Earnings

The measurement error associated with aggregated Cash earnings might be quite large for finite periods (Charitou & Clubb, 1999). For example, high growth companies might have negative Cash earnings for several periods, due to high investments, while less successful low growth firms might show persistent positive Cash Earnings, because of low investments. The decomposition of Cash earnings might help overcoming this issue.

Cash earnings can be decomposed as:

Accounting Earnings **(AE)**

*Plus* Accruals

=Cash Flows from Operations **(CFO)**

*Less* Investments **(CFI)**

---

= Cash Earnings **(CE)**

---

*Plus* Net Change in Loan Capital **(ΔL)**

Less Net Cash Flow **(NCF)**

= Flow to Equity **(FTE)**

In the spirit of Charitou & Clubb (1999), we will now consider in more detail why multivariate analysis incorporating components of Cash Earnings (CE) and Flow to Equity (FTE) may result in a stronger statistical association with security returns than univariate analysis based only on one cash flow measure (e.g. Cash earnings, CFO).

We will not go back to expression (20):

$$\frac{(\Delta P_t + d_t)}{P_{t-1}} = \frac{CE_t}{P_{t-1}} + \frac{\Delta CG_t}{P_{t-1}}$$

Assuming a return interval (0, T) and substituting $CE_T = CFO_T - CFI_T$, we obtain:

$$RET_T = CFO_T/P_0 - CFI_T/P_0 + \Delta CG_t/P_0 \qquad (21)$$

Furthermore, we can substitute $\Delta CG_T = \Delta P_T - NCF + \Delta L_T$.

$$RET_T = CFO_T/P_0 - CFI_T/P_0 - NCF_T/P_0 + \Delta L_T/P_0 + \Delta P_T/P_0 \qquad (22)$$

Although not part of the Cash Earnings, $NCF$ and $\Delta L_T$ are part of Flow to Equity, or net dividends, which is of interest to us. The two additional variable in expression (22) compared to (21) may contain information value for security returns beyond that of CFO and CFI.

Charitou & Clubb (1999) argue that the logics of decomposing the Cash Earnings is related to the fact that the decomposed cash flows variables might have different correlation with the change in Cash Goodwill ($\Delta CG_T$) or with the change in Price ($\Delta P_T$), and thus different effects on the security returns. A univariate analysis of returns based on aggregated Cash earnings, constrains the effects of CFO and CFI to be of equal magnitude, and opposite signs. This might not be the case, and the market might have different interpretations for the cash flow variables mentioned above. For example, positive net present value investments that have not been anticipated by the market will translate into a positive effect of the CFI on the security return, while aggregating it in Cash Earnings implies a negative effect on the return.

Change in Cash ($NCF$) and change in loan capital ($\Delta L_T$) in expression (22) will be associated with security returns only if they have information content beyond that of CFO and CFI. For example accumulation of cash might hint possible future investments that have not been anticipated by the market, or change in Loan capital might provide increased financial flexibility to the company, thus having an impact on the security returns (Charitou & Clubb, 1999).

So far, we have showed the limitations of analysing the relation between security returns and single aggregated Cash Earnings (or FTE), and how can considering multiple cash flow variables improves the explanatory power for security returns. In our empirical study we will also examine the incremental information of content of accounting earnings and different levels of cash flow variables. Based on a study by Feltham & Ohlson (1995), Clubb (1996) shows that both operating and non-operating cash flow measures might have incremental

information beyond accounting earnings. Over the long term, however, it is hard to predict whether cash variables have incremental information content over accounting earnings or not. The reason behind this is that over longer return periods, the errors in accounting earnings (e.g. matching problems) might decrease, which also lowers the probability of incremental information content of cash flows.

## 3.6 Variable definitions

In line with the association between accounting numbers and security returns presented in the previous sections, the accounting variables used to conduct our empirical tests are on a per-share basis (average number of shares outstanding at the beginning and at the end of the year), and a deflated by the price at the beginning of the period. The following variables are used:

AE = Accounting earnings (Net income) of the company, before discontinued operations, per average number of shares, deflated by the price at the beginning of the period;

ΔAE = Change in accounting earnings compared to the previous reporting year, per average number of shares, deflated by the price at the beginning of the period;

CFO = Cash flows from operations, per average number of shares, deflated by the price at the beginning of the period; [(EBIT + Depreciation – Interest paid – Tax paid – Change in working capital)/Average number of shares outstanding/$P_{t-1}$];

ΔCFO = Change in the Cash flows from operations compared to the previous reporting year, per average number of shares, deflated by the price at the beginning of the period;

FTE = Represents the flow to equity, per average number of shares, deflated by the price at the beginning of the period; Includes all the transaction with owners of equity (dividends, share repurchases, share redemptions, new share capital issued);

CFI = Cash Flows in Investments (Net Investments), per average number of

shares, deflated by the price at the beginning of the period;

NCF = Net Cash flow: change in the balance of cash and cash equivalents, per average number of shares, deflated by the price at the beginning of the period;

ΔL = Change in Loan capital (net), per average number of shares, deflated by the price at the beginning of the period;

RET = Buy-and-hold security return, including dividends; the return is calculated for the contemporaneous period over the corresponding reporting period for each period. [$RET_t = (P_t - P_{t-1} + D_t)/P_{t-1}$], where $D_t$ is the cash dividend paid in year t.

# 4 Hypotheses Development

The rationale for our empirical analysis is developed below building on previous work by Charitou & Clubb (1999), Dechow (1994), Charitou et al. (2000), Charitou & Ketz (1990), Plenborg (1999) and other similar studies analyzed in the previous research review chapter. This chapter is going to build hypotheses that serve as the main premises of our work.

As mentioned above, empirical research has thus far provided evidence that accounting earnings usually dominate cash flows in the marketplace as the summary measure of company performance. In addition, cash flows and other measures are used by the market as sources of information about the company instead or in tandem with earnings information. However, the findings in previous studies provide mixed evidence about the power of cash flow measures to explain security returns. Studies in the 1980s and 1990s presented inconclusive results about the cash flows informativeness. Some research showed that cash flows are valued equally with the earnings in the market place. These conclusions motivate to explore relative and incremental information content of each accounting measure with respect to one another. This distinction when comparing explanatory power of variables has long been used in accounting literature and usually defined in the following way: "relative information content asks which explanatory variable provides greater information content, whereas incremental information content concerns whether one variable has explanatory power beyond the other." (Habib, 2008)

Furthermore, the general notion in accounting posits that in the short periods cash flows suffer from timing and matching problems and earnings are subject to management manipulations. These errors get corrected over a lifetime of the firm, because earnings and cash flows at the end of the firm's existence cycle should be equal. Therefore, given the mixed findings in previous literature on earnings and cash flows importance, this study examines whether more consistent results about incremental and relative information content of accounting numbers are obtained using longer return intervals.

The hypotheses to be tested are in the null form. If the supposition under considerations is rejected, it means support was found for the opposite being true. We put our hypothesis in four groups to test the abovementioned notions. The first group is set to explore how well earnings and cash flows can explain security returns when being placed in separate regressions. The second group of hypotheses aims to summarize the analysis where different kinds of accounting variables are placed in the same regression. Both clusters of hypotheses are tested by using the yearly data. Hypotheses 3-4 are concerned with the same analysis as in the first hypotheses groups, just they are based on the data that involves longer than yearly measurement periods of the used variables. Below, the hypotheses are specified and discussed in more detail.

## 4.1 Relative Analysis of Security Returns, Cash Flows and Accounting Earnings

Firstly, this study compares the ability of earnings relative to cash flows from operations, flow to equity and net cash flows to reflect firm performance as measured by the stock price. Net cash flows fluctuate with cash inflows and outflows related to the firm's operating, investment and financing activities. Net cash flows do not have accrual adjustments and are conjectured to severely suffer from timing and matching problems. Cash flows from operations reflect the net cash flows generated by the operating activities. This accounting measure takes into account long-term accruals (balance of non-cash accounts that do not reverse within one year (Dechow, 1994)) and diminishes the timing and matching problems related to the firm's investment and financing activities. Nevertheless, cash from operations exclude short-term accruals associated with changes in firm's working capital and therefore might imprecisely reflect company's performance in the short term. Flow to equity similarly to cash flows from operations does not contain short-term accruals (in the calculation of the cash flow that is paid to equity shareholders, the change in net working capital is deducted).

Accounting earnings, on the other hand, contain accruals that mitigate timing and matching problems associated with cash flows from firm's operations, investment and financing activities (Dechow, 1994). Therefore, earnings are hypothesized on average to be a more useful than cash flows in measuring firm's performance over a shorter period of time. These premises generate the following predictions:

***Hypothesis 1a:*** *accounting earnings (AE) are relatively more informative than cash flow from operations (CFO) over short measurement periods*

***Hypothesis 1b:*** *accounting earnings (AE) are relatively more informative than flow to equity measure (FTE) over short measurement periods*

***Hypothesis 1c:*** *accounting earnings (AE) are relatively more informative than net cash flows (NCF) over short measurement periods*

As Easton & Harris (1991) noted, earnings levels and earnings changes variables have different valuation implications when earnings are more persistent (not extreme in their value as compared to other companies in the market) or transitory (abnormal to what other companies earn in the same year). If unexpected earnings (cash flows) are present they are better captured if the model includes both changes and levels of variables. Cheng & Yang (2003) state that such a model is better specified because the relative importance of earnings or cash flows levels or changes may be different. We take a note of this and test hypothesis 1a and compare relative explanatory power of level of earnings and change of earnings in one regression with another regression containing cash flow levels and changes.

Furthermore, flow to equity measure is a summary measure that can be disaggregated into cash flow statement items. The rationale for decomposing FTE into cash flow from operations, cash flow from investments, change in loan capital and change in net cash flow components suggests that those measures may be expected to contain information content for security returns. Statistically, a prudent inclusion of more variables into the regression usually improves the explanatory power of the model. In this case, we split one variable that is derived from the other four. Without any measurement errors, simple disaggregation should not enhance the explanatory power of the regression (Ou & Penman, 1989); however, in this case we believe that market values information contained in the variables after disaggregation differently.

Moreover, disaggregation of FTE into separate variables would not constrain regression coefficients on variables that are implicitly contained in FTE when running a univariate regression (regressing returns on FTE only). For example if CFO is uncorrelated with NCF and ΔL and if there is a one-to-one relationship between CFI and the latter two measures[11], there is an expectation the multiple regression coefficients for CFO and CFI would be one and zero respectively (as elaborated more in Charitou & Clubb, 1999). Also a univariate regression constricts sizes of CFO, CFI, NCF, ΔL coefficients and their signs (see Charitou & Clubb, 1999). Therefore, by taking into account these considerations we test *hypothesis 1b* not only with the univariate regression on FTE but also on the components of this measure in a multivariate model and we believe that decomposed FTE could explain relatively more variation in returns than the aggregated FTE measure, but it might not be enough to overrule the explanatory power of AE.

Finally, as discussed by Plenborg (1999), NCF might have information content, but it might not be relatively more informative than earnings measures. This is questioned in *hypothesis 1c*.

## 4.2 Incremental Analysis of Security Returns, Cash Flows and Accounting Earnings

By numerous studies it has been shown that cash flows (earnings) are associated with security returns given earnings (cash flows) (e.g. see Biddle et al., 1995; Charitou et. al, 2000; Charitou 1997 etc.). Regulatory bodies in the Western World and the International Accounting Standards Board (IASB) (in IAS 7) hold up a view that cash flow statement (cash flows) in addition to the income statement (earnings) is useful in evaluating stock of a company. Therefore, the hypotheses enlisted below have an objective to provide support for the propositions made by the regulatory bodies, as well as to re-evaluate prior studies which examined this issue:

***Hypothesis 2a:*** *Cash flow from operations (CFO) has incremental valuation content beyond accounting earnings (AE) over short measurement periods*

[11] A one-to-one relationship between investment measure (CFI) and NCF & ΔL (when they are viewed as merged into one) means that a given amount of net capital investment causes an exactly equal increase in NCF and ΔL which is an offsetting combined increase in equity funding, reduction in cash and increase in loans, creating no change in equity valuation.

***Hypothesis 2b:*** *Flow to equity measure (FTE) has incremental valuation content beyond accounting earnings (AE) over short measurement periods*

***Hypothesis 2c:*** *Net cash flows (NCF) has incremental valuation content beyond accounting earnings (AE) over short measurement periods*

*Hypotheses* such as *2a* and *2c* were tested in the prior studies; however, with inconclusive or mixed results (see Rayburn, 1986; Jennings, 1990; Charitou, 1997; etc.). In more recent research, the supplementary role of cash flows to earnings information and earnings to cash flow information was proved (see Cheng & Yang, 2003; Habib, 2008 etc.). However, this was indicated to depend on the regulatory environment and other country- or firm-specific factors and thus is worthwhile researching in Sweden.

What is more, with *hypothesis 2a* we would also like to investigate if earnings and cash flow levels and changes variables planted in one regression provide significant results with regards to incremental information content. *Hypothesis 2b* also includes the supposition that when disaggregated, FTE might also provide supplementary information content to the market given the earnings numbers.

## 4.3 Long Measurement Interval Predictions Regarding Relative Analysis Regression

Over longer return intervals (of two and three years), cash flows will suffer from fewer timing and matching problems, thus the importance of accruals diminishes (Dechow, 1994). Hence, assuming clean surplus, over longer measurement periods, earnings and cash flows are expected to converge as measures of company performance. The hypotheses below predict the direction of this convergence:

***Hypothesis 3a:*** *contemporaneous*[12] *association of stock returns (RET) with cash flow from operations (CFO) improves relative to the contemporaneous association of stock returns (RET) with earnings (AE) as the measurement interval is increased.*

***Hypothesis 3b:*** *contemporaneous association of stock returns (RET) with disaggregated flow to equity measure (into CFO, CFI, NCF and ΔL) improves relative to the contemporaneous association of stock returns (RET) with earnings (AE) as the measurement interval is increased.*

[12] Current returns are correlated with current accounting measures

It should be noted that the ability of earnings to give information about firm performance is also expected to improve as the measurement period is expanded, as documented in Easton et al. (1992). Our empirical investigation can render insights into the importance of accruals which represent the difference between the accounting earnings and cash flow measures.

We focus on testing two particular predictions regarding CFO and decomposed FTE because these variables are expected to demonstrate biggest changes in explanatory power as the measurement period increases. So, the evidence that the ability of cash flows to reflect firm performance over commonly accepted reporting period (one year) is poor and improves when using longer measurement periods, would confirm the economic importance of accruals.

## 4.4 Long Measurement Interval Predictions Regarding Incremental Analysis Regressions

Since our work also considers incremental information content of accounting variables, it is relevant to acknowledge the possible impact of return intervals (exceeding one year) on incremental information value that cash flow variables give. Specifically, while it might be expected that multiple cash flow data will have some incremental explanatory power in given accounting earnings over annual return intervals, the considerable reduction in measurement error in accounting earnings over longer periods might be expected to lower the probability for cash flows add incremental value in explaining returns over longer periods (Charitou & Clubb, 1999). The below hypotheses are an extension of previous research, because not many studies focused on analyzing the degree to which multivariate cash flow information carries incremental information content as the return interval is prolonged. We hypothesize that:

***Hypothesis 4a:*** *Given the association of security returns and accounting earnings, cash flow from operations (CFO) does not have incremental information content over long return intervals.*

***Hypothesis 4b:*** *Given the association of security returns and accounting earnings, flow to equity measure (FTE) does not have incremental information content over long return intervals.*

*Hypothesis 4b* also covers the test of disaggregated FTE incremental explanatory power. In particular, it is conjectured that given the association of security returns and accounting earnings, disaggregated flow to equity measures (CFO, CFI, NCF and $\Delta$L) might still not

have incremental information content over long return intervals. Disaggregation of FTE may lead to improved explanatory power beyond earnings if accrual components and accounting earnings are valued differently and if the variables CFO, CFI, NCF and ΔL provide value relevant information that is not contained in accounting earnings. This is checked empirically in the later chapters.

# 5 Research Method

To test the hypotheses presented in the previous chapter, we have designed an extensive set of regression equations, using the variables described in section 3.6.

$$RET_{iT} = \beta_0 + \beta_1 AE_{iT} + \varepsilon_{iT} \quad \text{(M1)}$$

$$RET_{iT} = \beta_0 + \beta_1 CFO_{iT} + \varepsilon_{iT} \quad \text{(M2)}$$

$$RET_{iT} = \beta_0 + \beta_1 NCF_{iT} + \varepsilon_{iT} \quad \text{(M3)}$$

$$RET_{iT} = \beta_0 + \beta_1 FTE_{iT} + \varepsilon_{iT} \quad \text{(M4)}$$

$$RET_{iT} = \beta_0 + \beta_1 CFO_{iT} + \beta_2 CFI_{iT} + \beta_3 NCF_{iT} + \beta_4 \Delta L_{iT} + \varepsilon_{iT} \quad \text{(M5)}$$

$$RET_{iT} = \beta_0 + \beta_1 AE_{iT} + \beta_2 \Delta AE_{iT} + \varepsilon_{iT} \quad \text{(M6)}$$

$$RET_{iT} = \beta_0 + \beta_1 CFO_{iT} + \beta_2 \Delta CFO_{iT} + \varepsilon_{iT} \quad \text{(M7)}$$

$$RET_{iT} = \beta_0 + \beta_1 AE_{iT} + \beta_2 CFO_{iT} + \varepsilon_{iT} \quad \text{(M8)}$$

$$RET_{iT} = \beta_0 + \beta_1 AE_{iT} + \beta_2 \Delta AE_{iT} + \beta_3 CFO_{iT} + \beta_4 \Delta CFO_{iT} + \varepsilon_{iT} \quad \text{(M9)}$$

$$RET_{iT} = \beta_0 + \beta_1 AE_{iT} + \beta_2 NCF_{iT} + \varepsilon_{iT} \quad \text{(M10)}$$

$$RET_{iT} = \beta_0 + \beta_1 AE_{iT} + \beta_2 FTE_{iT} + \varepsilon_{iT} \quad \text{(M11)}$$

$$RET_{iT} = \beta_{0i} + \beta_1 AE_{iT} + \beta_2 CFO_{iT} + \beta_3 CFI_{iT} + \beta_4 NCF_{iT} + \beta_5 \Delta L_{iT} + \varepsilon_{iT} \quad \text{(M12)}$$

*) where $i$ is the company, $T$ is the length of the period and $\varepsilon_{iT}$ is a disturbance term.

Through these models, we do not try to explain all the variation in the dependent variable, but rather we want to see which measures explain a larger part of the variation in the dependent variable (security returns). Beisland (2009) states that: "in regression analysis, $\bar{R}^2$ [13] measures the proportion of the dependent variable explained by the independent variable(s)." The same study states that $\bar{R}^2$ is the proxy for the explanatory power, or for the value relevance of the analysed accounting variables for the independent variable (e.g. stock prices, security returns). It follows logically that in our regression models, where security return is the dependent variable, and selected accounting measures (e.g. AE, CFO etc) are independent variables, the highest $\bar{R}^2$ indicates the model that has the highest explanatory power for

[13] This is a denotation of the adjusted R-squared that we report in our results

security return. Therefore, in our attempt to determine which accounting metric has the highest information content, the focus will be primarily on the $\bar{R}^2$ reported by the different models.

(M1) – (M7) are used to test **Hypotheses 1a – 1c**. In line with previous research (Dechow, 1994; Plenborg, 1999; Habib, 2008), we compare the relative information content of earnings and different cash flow variables by comparing the explanatory power ($\bar{R}^2$) of the specifications.

Only level specification of earnings and cash flows are used in (M1) – (M4). Similar equations considering the level of earnings and the level of different cash flow measures have been used by studies measuring the relative information content of earnings and cash flows (Dechow, 1994; Charitou & Clubb, 1999).

(M5) is the decomposition of FTE into different cash flow variables. As we showed in chapter 3, the decomposition of an aggregate cash flow measure might yield better results if the market values the components differently.

Studies in earnings-return models suggest taking the change in earnings along with the level of earnings provides a better indication for unexpected results, thus showing a better association with returns (Easton & Harris, 1991; Strong & Walker, 1993). Similarly, Ali & Pope (1995) obtain the same results for cash flows. Therefore, in (M6) and (M7) we use both a level and change specifications of earnings and cash flows.

**Hypotheses 2a-2c** are tested through regression equations (M8) – (M12). To measure the incremental explanatory power of cash flow measures to accounting earnings, multivariate regression including the level specification of earnings and of different cash flow proxies are used [(M8), (M10) and (M11)].

To make it consistent, we also consider the multivariate regression on both level and change specifications of earnings and Cash flows from operations (M9). Furthermore, we also consider whether disaggregated cash flow variables have increased incremental information content over simple cash flow measures in (M12).

To test the hypothesis concerning **long-term intervals**, the same models [(M1) – (M12)] are used, with the following considerations:

- We consider long-term periods the periods that are longer than 1 year. In this respect, we have considered periods of 2 Years and 3 Years (T=2 and T=3). For T=2, we calculated the variables for 6 non overlapping periods 1998-1999, 2000-2001, 2002-2003, 2004-2005, 2006-2007 and 2008-2009. For T=3, we calculated the variables for 4 non overlapping periods 1998-2000, 2001-2003, 2004-2006 and 2007-2009.
- The returns over periods longer than 1 year were calculated by compounding one year returns over the relevant period. The following formula was used to calculate the return for period of T years starting in year t (t,T):

$$RET(t,T) = \prod_{i=t}^{t+T} RET_i$$

- The accounting variables for periods longer than 1 year where calculated as the sum of values per average number of shares for each year, deflated by the price at the beginning of the first year of the relevant period:

$$X(t,T) = \left(\sum_{i=t}^{t+T} \frac{X_i}{N_i}\right) \Big/ P_{t-1}$$

where $X_i$ is the accounting variable (AE, ΔAE, CFO, ΔCFO, CFI, NCF, FTE, ΔL); $N_i$ is the average number of shares for year $i$; $P_{t-1}$ is the share price at the beginning of the first year t.

# 6 Data

## 6.1 Sample

The sample consists of companies listed on the Stockholm Stock Exchange (owned by Nasdaq OMX) from 1998 through 2009. The data set was retrieved by using the comprehensive accounting database at the Stockholm School of Economics[14] as well as DATASTREAM and covered a slightly longer period 1997-2010, because models in our study include changes variables and because companies had different financial reporting year-ends.

[14] The database is called "Finbas" and contains daily price data and accounting data for the Nordic area. The database was given as a gift to SSE by Nasdaq OMX on 31 December 2010.

Firstly, to be included in our sample, companies had to have all the data available that we used in our empirical models and the data we needed to calculate the variables[15]. In particular, stock price and dividends per share were retrieved to calculate the dependent variable stock/security returns (RET). For independent variables, companies had to have all values for net income/accounting earnings (AE), cash flow from operating activities (CFO), cash flow from investment activities/net cash investments (CFI), net cash flows/change in cash (NCF), and change in financial loans/change in loan capital (ΔL). To have all variables on per share basis we use the number of common shares outstanding, calculated as a simple average of shares outstanding at the beginning and at the end of the year. The variables were scrutinised and adjusted to take into account stock splits and reverse splits, interim dividends, and rights offerings. Companies on the Swedish stock market may issue both A and B classes of common stocks and preferred shares. In this study, B class shares were used to calculate stock returns as these shares are most liquid and reflect the underlying reality of the company performance.

Secondly, all selected companies had to have at least two consecutive years of accounting data due to the specifications in our models. To calculate security returns, the opening and closing share prices, and cash dividends per share were necessary. Other variables had to be available at least on a yearly basis. Where a company changed its financial year-end, the corresponding company-year was removed.

Furthermore, companies listed on alternative stock exchanges such as First North of Nasdaq OMX, AktieTorget were not taken into the sample. Also, if a company changed from the main Stockholm Nasdaq OMX exchange to one of the alternative equity marketplaces, was delisted or had Stockholm OMX as not the primary listing place, the data was scrutinized not to take into account the values that were recorded beyond the period of a company being listed on Nasdaq OMX Stockholm market. In addition, financial profile companies belonging to such sectors as banking, insurance services or real estate industry were eliminated due to their operational specificity.

The above sampling decisions significantly slashed the number of observations in the study and yielded 1836 yearly company-years of data. However, when investigating longer return periods of two and three years, we have eliminated the companies that did not have data

[15] Denotations of data variables in DATASTREAM were the following: Net Income (WC01551); Change in cash (WC04851); Net Cash Flows from Operations (WC04860); Net Cash Flow from Investing (WC04870); Common Shares outstanding (WC05301); Stock Price (P); Dividends (DPS).

available for all the years in the considered period. Therefore, the number of observations naturally decreased again and totals 847 company-periods for time windows of 2 years and 522 company-periods for time windows of 3years (see table 1). Security returns for a one-year interval were gauged as the change in share price over the fiscal year plus the dividends divided by the opening price. For longer intervals, the return is given by compounding the one-year returns over the relevant period. Accounting variables are total company values aggregated over a period, where a period may equal one, two or four years and are scaled by the share price at the beginning of the first fiscal year of the relevant interval. For one-year period variables were calculated from 1998 through 2009 inclusive; for two-year interval, variables were calculated for six non-overlapping periods; for three-year measurement windows, variables were calculated for three non-overlapping[16] periods. Due to these actions there are fewer observations in the longer measurement intervals.

Additionally, outlying (extreme) observations have been removed in order not to contaminate the sample. It is a usual practice and in the studies of similar kind to curtail 1% (for example, see Easton & Harris, 1991; Strong & Walker, 1993; Charitou 1997; Habib, 2008) at each end of the variable values or apply the elimination of values that are above (below) five or three standard deviations from the mean (see Clubb, 1995; Dechow, 1994) . After careful considerations, we decided to employ the latter technique (even though we get similar eliminations when using other methods) on the key variables (Subramanyam & Venkatachalam, 2007, eliminates the extreme values in main variables) and deleted the extreme values of RET, AE, and CFO from sample observations. After doing so, the final one-year measurement window observations totalled 1796 firm-years.

Lastly, it should be noted, however, that that some variables are imperfect proxies for the theoretical variables and this might be expected to weaken the empirical findings[17].

[16] Non-overlapping periods are used in previous studies and are motivated to give less biased results. If the periods overlap, then the same items are accounted for in several time periods

[17] FTE might not always represent the net dividend as required in valuation theory; asset acquisitions directly financed by debt or equity issue should be included in investment measure by valuation theory; AE may not always reflect the clean surplus income regarding the book value of equity in the balance sheet.

Table 1. Impact of outliers and long measurement intervals on sample size

| | With outliers | | Without outliers | |
|---|---|---|---|---|
| Measurement period | Company-years | No. of companies | Company-years | No. of companies |
| 1year | 1836 | 253 | 1796 | 252 |
| 2year | 847 | 218 | 828 | 216 |
| 3year | 522 | 196 | 514 | 195 |

The table represents the pooled sample of data where observations are not restricted to any particular years, attached to an industry or have restrictions to fiscal year-end.
Source: Compiled by the authors

## 6.2 Descriptive Statistics

Table 2 presents the statistics on the variables used in analysis. The earnings per share variable, deflated by price, has a median value of 0.049, 0.093, and 0.134 for the yearly, two-year and three-year interval respectively. Two-year earnings are approximately twice as large as the annual earnings and the three-year earnings are just about three times greater than yearly earnings. A similar pattern is observed in the cash flow from operations, cash flow from investing, net cash flows, and flow to equity numbers.

Since variables are scaled by the price at the beginning of the period, average values would tend to increase more than proportionally over longer periods due to the reinvestment of earnings, according to Dechow (1994). In our case, the increase in averages is almost proportional for CFO, CFI, NCF, FTE variables, with NCF and FTE more than tripling between one- and three-year intervals. The disproportionally higher increases in means and medians of variables are consistent with the growth "productive assets and working capital" notion[18]. When combining CFO and CFI into cash flow after investing activities (CFAI), one can see that this measure more than triples between one- and three-year measurement periods. These statistics illustrate how growth in operating cash flows exceeds investment growth. This conveys that Swedish companies in the period of interest did not invest heavily because for a number of companies aggregated cash from investment activities does not surpass cash flow from operations.

Change in loan capital (ΔL) has a median value of zero or close to zero in all periods pointing to the fact that a lot of companies in the sample kept their leverage stable[19]. A negative yearly mean value shows that companies on average were deleveraging. Over longer intervals, the

[18] Investment took place in assets that were productively employed to generate cash flows
[19] Also, by looking into annual financial reports of the Swedish companies, we discovered that a substantial part of them have their debts at zero. This and the descriptive statistics are indicative of the fact that low (or no) leverage is kept constant over time in such companies

change in loan capital was positive but close to zero, which is lower than documented in similar studies, e.g. Charitou & Clubb (1999). More sluggish increase in debt might have been a result of the severe economic downturn which affects our sample observations.

Table 2. Descriptive statistics of data for the annual, two-year, and three-year intervals

| Variable | Mean | Std. Dev. | Min | Max | Upper Quartile | Lower Quartile | Median |
|---|---|---|---|---|---|---|---|
| *Yearly (observations = 1796)* | | | | | | | |
| RET | 0.125 | 0.555 | -0.934 | 2.250 | 0.422 | -0.267 | 0.067 |
| AE | 0.014 | 0.172 | -1.623 | 0.896 | 0.089 | -0.012 | 0.049 |
| CFO | 0.088 | 0.162 | -0.880 | 1.209 | 0.150 | 0.019 | 0.079 |
| CFI | 0.077 | 0.214 | -1.704 | 3.313 | 0.113 | 0.015 | 0.052 |
| CFAI | 0.011 | 0.242 | -2.918 | 2.498 | 0.079 | -0.059 | 0.017 |
| FTE | 0.006 | 0.112 | -1.455 | 0.532 | 0.040 | 0.000 | 0.018 |
| NCF | 0.002 | 0.133 | -1.783 | 1.827 | 0.033 | -0.027 | 0.001 |
| ΔL | -0.005 | 0.207 | -2.555 | 1.903 | 0.036 | -0.034 | 0.000 |
| ΔAE | 0.018 | 0.255 | -1.456 | 7.004 | 0.038 | -0.028 | 0.006 |
| ΔCFO | 0.018 | 0.182 | -1.165 | 3.658 | 0.056 | -0.029 | 0.010 |
| *Two-year (observations = 828)* | | | | | | | |
| RET | 0.178 | 0.713 | -0.995 | 3.722 | 0.502 | -0.293 | 0.045 |
| AE | 0.052 | 0.243 | -1.954 | 0.976 | 0.167 | -0.022 | 0.093 |
| CFO | 0.162 | 0.239 | -0.879 | 1.442 | 0.273 | 0.046 | 0.158 |
| CFI | 0.142 | 0.309 | -2.409 | 2.190 | 0.216 | 0.030 | 0.104 |
| CFAI | 0.020 | 0.341 | -1.808 | 3.308 | 0.128 | -0.099 | 0.024 |
| FTE | 0.025 | 0.138 | -1.014 | 0.709 | 0.079 | 0.000 | 0.035 |
| NCF | 0.003 | 0.122 | -0.848 | 0.722 | 0.039 | -0.028 | 0.004 |
| ΔL | 0.005 | 0.291 | -3.443 | 1.642 | 0.070 | -0.044 | 0.000 |
| ΔAE | 0.035 | 0.342 | -0.887 | 7.030 | 0.057 | -0.034 | 0.009 |
| ΔCFO | 0.028 | 0.189 | -0.749 | 3.678 | 0.064 | -0.025 | 0.016 |
| *Three-year (observations = 514)* | | | | | | | |
| RET | 0.365 | 1.191 | -0.996 | 6.082 | 0.710 | -0.410 | 0.021 |
| AE | 0.106 | 0.332 | -1.731 | 1.326 | 0.260 | -0.030 | 0.134 |
| CFO | 0.266 | 0.369 | -0.829 | 2.413 | 0.397 | 0.070 | 0.237 |
| CFI | 0.213 | 0.385 | -2.751 | 2.503 | 0.318 | 0.049 | 0.162 |
| CFAI | 0.053 | 0.452 | -2.314 | 3.747 | 0.165 | -0.133 | 0.028 |
| FTE | 0.047 | 0.197 | -1.433 | 1.058 | 0.127 | -0.008 | 0.052 |
| NCF | 0.009 | 0.139 | -0.708 | 1.309 | 0.045 | -0.035 | 0.003 |
| ΔL | 0.004 | 0.345 | -3.904 | 1.806 | 0.087 | -0.041 | 0.003 |
| ΔAE | 0.026 | 0.190 | -0.887 | 1.589 | 0.066 | -0.041 | 0.006 |
| ΔCFO | 0.036 | 0.137 | -0.572 | 1.158 | 0.077 | -0.018 | 0.023 |

All the variables are on a per share basis (average number of shares at the beginning and the end period was used), scaled by the beginning-of –period price. Observations span from 1998-2009. For the longer intervals, the data is split into six and four non-overlapping periods. Stock returns are raw and not marked-adjusted (by deducting value weighted market return from the stock return of a company results are very similar). Also the company stock return over 12 months (24 months and 36 months) is calculated for the actual fiscal year (years)
Source: Compiled by the authors

As expected, net cash flows have consistently lower mean than earnings, which is usually the case since company's investing and financing principles have impact on cash flows, but not on earnings. For instance, when a company pays dividends, it decreases retained earnings and cash but not reported accounting earnings.

Furthermore, earlier studies (e.g. Dechow 1994; Plenborg, 1999; Charitou & Clubb, 1999) provide evidence about cash flow variables fluctuating more than accrual based performance measures (earnings). For example, the standard deviation of cash flow from investment activities is constantly and significantly higher than the standard deviation of earnings. Nevertheless, CFO and NCF variables demonstrate lower variations in values, which runs contrary to findings in prior studies. Also, the fact that standard deviation of CFO does not decline relative to that of AE for longer periods suggests that "accruals do not offset extreme negative and positive cash flow realisations associated with mismatched cash receipts and disbursements over short measurement periods." (Dechow, 1994) In addition to that, one fourth or more of earnings observations are usually negative, while the cash flow from operations never has a lower quartile cut-off point at a negative value. This might well be a consequence of the global financial distress. However, the deviations from the "usual values" are not significantly higher for earnings and therefore this case calls for deeper analysis, which is performed in the subsequent chapters.

The mean and the median for the change variables in earnings and changes in cash flow from operations are approximately the same in the annual measurement period. However, the as the return interval is extended, the ΔCFO exhibits less variation in values than ΔAE. Such findings indicate that earnings might be more transitory (having relatively more extreme values) than cash flows, even though as a rule cash flows should demonstrate higher standard deviations due to a relatively higher proportion of transitory items (Plenborg, 1999). Changes variables do not actually follow the same pattern as the levels of these variables showing that change rates of AE and CFO are more moderate from one period to another for longer measurement intervals.

## 6.3 Collinearity Diagnostics

To see the strength of linear association between variables, the Pearson[20] correlation tests are performed (see table in appendix). Correlation coefficients are indicative of the degree of dependence between the pair of variables, but do not show the causality (ability of one variable to explain another) as regression coefficients. This is important to note when exploring correlations between the dependent and independent variables. However, Lev (1989) reports very low correlation between returns (dependent variable) and accounting earnings (independent variable) and then finds that earnings have poor explanatory power for returns in the regression analysis. In our case, RET and most variables have correlations that are significantly greater than zero. The only variables that are not associated in the annual data set are FTE and ΔL and in the three-year measurement interval only ΔL stays insignificantly related to RET, suggesting that this variable might also not be the most influential in the regression models.

The magnitudes of the correlations between the stock return of a company and main variables (AE and CFO) reported in prior studies (e.g. Charitou, 1997; Habib, 2008) are close to the values calculated in our sample. While the RET – CFO associations are of similar degree (0.19, 0.35, 0.50 for one-, two-, and three year windows respectively) and lower than RET – AE correlations, AE correlations in this study are somewhat below (0.23, 0.43, and 0.54 for one-, two-, and three year windows respectively) the values documented in e.g. Charitou (1997). Annual AE correlations with RET are exactly value (0.23) reported in Habib (2008).

Furthermore, as expected, the correlation between earnings and cash flow from operations increases as the measurement interval is expanded. The values are 0.49 and 0.68 for the one-year and three-year intervals respectively. This finding confirms that smaller proportion of earnings is reflected by current accruals over the three-year period compared to one-year interval. In addition, Easton et al (1992) explain that the increased relationship between these variables is likely because over longer measurement intervals, errors in aggregate earnings and cash flows are prone to becoming relatively less important.

As to other variables, the earnings changes and cash flow changes variables are significantly positively correlated. In general, it is noticeable that as the measurement interval increases, there is a greater possibility that multicollinearity problems might affect the multivariate

[20] Since our sample does not contain missing data, the simple STATA correlation matrix gives the same results. Since our data is approximately normally distributed, Spearman rank correlation yields similar results.

regressions. But the next section describes in more detail the techniques applied in order to test for multicollinearity.

In sum, it is worthwhile emphasizing that the sizeable increase of the correlation coefficients between returns and cash flows as measurement interval is expanded is in line with the matching principle: "accruals smooth the temporary components in cash flows" in the shorter periods (Charitou, 1997). Overall, the collinearity results are consistent with most results provided by Dechow (1994) as the measurement interval increases the relationship between returns and all earnings and cash flow variables increases.

## 6.4 Regression Model Testing

This part provides a brief insight into econometrical aspects of our study. In particular, it describes the tests that would give statistical credibility to the regression results obtained in this study. With the help of different statistical tests we can identify common statistical issues, i.e. heteroscedasticity, multicollinearity and autocorrelation which need to be addressed.

Our study investigates the phenomenon that includes numerous entities (companies) and spans over multiple time periods, therefore our data set has both a cross-sectional and a time series dimension. Our sample of companies slightly differs from year to year, because there are few companies that have all observations with regards to required data over 12-year period under investigation. The data set exhibiting such characteristics is usually referred to in econometrics as pooled data with unbalanced panel, or simply unbalanced panel data (Wooldridge, 2009). We treat all observations for all of the time periods as a single sample, which suggests that the pooled ordinary least squares (OLS) method is applicable in regression analysis. Like many other studies in the field, in our analysis we assume that returns – accounting measures associations are of linear nature. As the purpose of our research is not to explain all the variation in the dependent variable, all the uncontrolled for or unobserved effects would be captured by the error term in the regressions and this requires particular treatment. Therefore, in order for the OLS method to yield most efficient and

unbiased estimators, several strict assumptions[21] should be met. We test[22] if the main assumptions hold for all our regression models[23], violation of which could potentially harm our analysis.

To start with, homoscedasticity (variance of the error term is constant and the error term's variance is independent from the other variables) is favoured by OLS, which means populations of the dependent variable corresponding to various independent variable values have the same variance (Gujarati, 2004). When the assumptions are satisfied the regression is seen as homoscedastic, otherwise it is referred to as heteroscedastic. If the error term is heteroscedastic the results of the regression cannot be seen as reliable. There are several tests offered by our statistical package. We rely on the results of the so-called White's test because, according to Gujarati (2004), is easy to perform and does not rely on the normality assumption. Results[24] give evidence that heteroscedasticity is present in several models over varying measurement intervals. Unequal variance of the error term affects all the models in annual measurement intervals. (M2) (M3) (M7) (M9) do not reject the homoscedasticity hypothesis in both two- and three-year periods and (M5) and (M8) have constant error term variance in two- and three-year return interval respectively. In such a case, Gujarati (2004) prescribes to use White's Heteroscedasticity-Consistent Variances and Standard Errors (or robust standard errors option) in regression models. White has shown that this estimate can be performed so that large-sample statistical inferences can be made about the true parameter values. Of course, "heteroscedasticity-corrected standard errors are considerably larger than the OLS standard errors" and therefore significance of parameters is affected. By using beginning-of-the period market value to deflate the variables in regression model (as we did), one usually reduces the heteroscedasticity problem (Cheng & Yang, 2003).

Furthermore, OLS assumes no perfect multicollinearity, i.e. there are no perfect linear relationships among the explanatory variables (Gujarati, 2004). This pertains to the

[21] The statistical meaning and implications of the assumptions and econometric theories are not discussed in this work since it is outside the scope of the work and the authors assume that the reader has a minimum knowledge of econometrics or can refer to e.g. the following readings: Gujarati (2004), Wooldridge (2009)
[22] All tests are conducted by using STATA 10.1 statistical software
[23] Regression model statistical characteristics were tested on the all measurement interval data
[24] Tables representing these and other results discussed in this chapter are available on request, as the authors do not deem that the unwieldy output representations are necessary to display in this thesis, especially when it is not a common practice to show the results of such tests in the studies that are not conducted on a purely econometrical topic

multivariate regression models in our analysis (i.e. (M5) – (M12)). If perfect linear dependencies between some variables exist, the regression coefficients of the variables contain standard errors that are infinite. If multicollinearity is less than perfect, "the coefficients possess large standard errors (in relation to the coefficients themselves), which means the coefficients cannot be estimated with great precision or accuracy." To check if the multicollinearity might be a problem, one should start by investigating correlations among the variables. Drawing on out collinearity diagnostics in section 6.3 we can conclude that the only cases showing significant association are the following: FTE with NCF (correlation coefficient > 0.80) and ΔL with the cash flow measures (correlation coefficients ranging 0.64 – 0.81) in one-year interval data set; AE with CFO (correlation coefficients >0.60) and ΔL with CFI (correlation coefficients ranging 0.66 – 0.71) in data panels on two- and three-year measurement intervals. However, one should not that FTE and NCF never appear in the same regression and AE and CFO have stronger correlations as the measurement windows are lengthened by expectation, so the multicollinearity is not a really a problem. The only expectation about weak results might be with regards to ΔL. It is also possible to see indications of multicollinearity on the variance inflation factor (VIF) which shows how the variance of an estimator is inflated by the presence of multicollinearity. VIF is calculated from the tolerance value which estimates how much of a specific variable's variance that is unique (Gujarati, 2004). The test shows no presence of multicollinearity among the variables in any of the regressions for all measurement periods.

Moreover, in order to obtain correct output from the regression, a necessary assumption to make is that the error term is not correlated at a specific point of time with another error term at another point of time or in other words the model assumes that the disturbance term relating to any observation is not influenced by the disturbance term relating to any other observation (Gujarati, 2004). One of the most popular techniques to detect residual correlation is to plot predicted residuals in the regression against time, plot residuals against their lagged value or calculate correlation statistics between residuals. The decision about autocorrelation is slightly arbitrary, but the statistical models in our case do not suffer from residual autocorrelation as correlations are of very low significance. It is important to note that autocorrelation of error terms becomes relatively more salient as the measurement interval is increased. This is expected as by aggregating variables and eliminating missing

values we get a more balanced sample in terms of similar companies in each time period (and fewer time periods) and then the unobserved effects (captured by the error component) might exhibit some time-dependence.

Finally, there were other diagnostic measures applied to make sure that the chosen estimation method provides most reliable results, given the data. In particular, normality of the variables were tested and proved to meet the normal distribution requirement as there were no extreme values that could distort estimation. Next, statistics were tested; this helped obtain results that are more robust to arbitrary serial correlation and heteroscedasticity in residuals (regression error terms). Thus, we can be more sure that the effects (unobserved effects) captured by the error term do not create biases that have a negative impact on regression output.

# 7 Empirical Results

In this chapter we describe the empirical results of our research. The chapter is divided into three sections. In the first two sections we present the results that relate to testing of the research hypothesis presented in chapter 4. Section 7.1 provides tests for hypotheses 1 (a, b, c) and hypotheses 2 (a, b, c), related to the time windows of one year. Further, section 7.2 will provide tests for hypotheses 3 (a and b) and hypotheses 4 (a and b), related to longer time intervals. Finally, in the third section of this chapter, we describe whether the adoption of IFRS in Sweden has influenced the relevance of earnings.

## 7.1 Results for One Year Time Intervals

This section presents the empirical results for short-term intervals (one year). We analyse both the relative and the incremental information content of earnings and cash flow measures. First, we describe the results that relate to testing hypotheses 1a-1c (relative information content). Afterwards, the results related to testing hypotheses 2a-2c (incremental information content) are presented.

### 7.1.1 Relative Information Content of Earnings and Cash Flow Measures over Short Periods

Hypotheses 1a-1c predict that earnings are relatively more informative than cash flow measures (Cash flows from operations, Net cash flows, Flow to equity) over short

measurement intervals. The hypothesis is tested by performing seven pooled regression described in chapter 5: (M1) – (M7). The results of the regressions are summarised in table 3.

The findings for the accounting earnings variable (M1) indicate that estimated coefficient is positive and statistically different from zero at 1% significance level. This implies that earnings are positively associated with security returns. The adjusted R-squared ($\bar{R}^2$) of the regression (M1) is 5.3%, which means that the regression model explains 5.3% of the market returns in our sample of observations.

Table 3 . Summary of results for tests comparing the association of earnings and the association of cash flows to security returns over time intervals of one year. (N=1796)

| Variable | | M1 | M2 | M3 | M4 | M5 | M6 | M7 |
|---|---|---|---|---|---|---|---|---|
| AE | Coefficient | 0.690*** | | | | | 0.694*** | |
| | (t-statistics) | (10.07) | | | | | (10.16) | |
| CFO | Coefficient | | 0.439*** | | | 0.679*** | | 0.459*** |
| | (t-statistics) | | (8.24) | | | (8.09) | | (8.59) |
| NCF | Coefficient | | | 0.102*** | | 0.493*** | | |
| | (t-statistics) | | | (2.86) | | (7.75) | | |
| FTE | Coefficient | | | | -0.0772* | | | |
| | (t-statistics) | | | | (-1.76) | | | |
| CFI | Coefficient | | | | | 0.380*** | | |
| | (t-statistics) | | | | | (4.53) | | |
| ΔL | Coefficient | | | | | -0.224*** | | |
| | (t-statistics) | | | | | (-2.59) | | |
| ΔAE | Coefficient | | | | | | 0.139*** | |
| | (t-statistics) | | | | | | (3.66) | |
| ΔCFO | Coefficient | | | | | | | 0.211*** |
| | (t-statistics) | | | | | | | (3.56) |
| | Intercept | 0.117*** | 0.0888*** | 0.124*** | 0.125*** | 0.0335** | 0.114*** | 0.0824*** |
| | (t-statistics) | (9.20) | (6.54) | (9.48) | (9.53) | (2.35) | (8.92) | (6.03) |
| SSE | | 522.7 | 532.1 | 549.7 | 551.3 | 497.4 | 518.8 | 528.4 |
| F-value | | 101.5*** | 67.85*** | 8.181*** | 3.089* | 49.40*** | 57.78*** | 40.47*** |
| $R^2_{Adj}$ (%) | | 5.3% | 3.6% | 0.4% | 0.1% | 9.7% | 5.9% | 4.2% |

( ): t-statistics in parentheses; ***, **, *: statistically significant at 1%, 5% and 10%, respectively;
AE – earnings; CFO – cash flow from operations; NCF – net change in cash and cash equivalents; FTE – flow to equity; CFI – investments; ΔL – net change in debt; ΔAE – change in earnings, compared to the previous year; ΔCFO – change in CFO, compared to the previous year. All variables are deflated by the opening price at the beginning of the year.
Source: Compiled by the authors from STATA outputs

For cash flow variables (CFO, NCF and FTE), the results are mixed. For CFO and NCF, the estimated coefficients are positive and statistically different from zero at 1% significance level, which exhibits some association between these variables and security returns.

However, for NCF (M3) $\bar{R}^2$ is only 0.4%, which indicates that the regression equation only explains a very small part of the security returns. This means that just the increase/decrease in cash and cash equivalents for a one year period does not provide much informative value to investors. (M4) results show that there is a negative association between flow to equity and security returns. This might seem somewhat counterintuitive, considering that a company that pays dividends could be attractive to investors. A possible explanation for this result could originate in the period over which our research spans: 1997-2009. In this interval there have been 2 crises leading to a general decrease of stock prices: in the early 2000s, after the dot-com bubble had burst, and in 2008-2009, following the sub-prime crises. In these periods, companies might have continued to pay dividends, while stock returns were negative, thus leading to a negative association between security returns and FTE. Moreover, the estimated coefficient for FTE is only significant at 10%, while the $\bar{R}^2$ of the regression is only 0.1%, thus pointing out that the association between FTE and security returns over the considered period is marginal.

$\bar{R}^2$ of 5.3% reported for the earnings model (M1) is somewhat lower than the one reported in previous studies (e.g. Dechow, 1994; Easton & Harris, 1991; Charitou & Clubb, 1999). However, the relative information content of earnings and individual cash flows variables in explaining security returns is consistent with previous research. $\bar{R}^2$ for earnings is higher than $\bar{R}^2$ for any of the three cash flow measures, thus indicating that over one year periods, earnings are generally more informative than cash flows.

The results for (M6) and (M7) show that including changes in specification variables along with the level of the specification variables can improve the explanatory power. This finding is in line with previous studies, such as: Easton & Harris (1991), Strong & Walker (1993) and Ali & Pope (1995). Including both the level of earnings and the change in earnings increases the $\bar{R}^2$ from 5.3% to 5.9%. At the same time, the coefficient for earnings increases slightly from 0.690 to 0.694, and remains significant at 1% level, while the coefficient for the change in earnings is also positive and statistically different from zero at 1% significance level. A similar pattern can be observed for cash flows from operations. Inclusion of both the level of CFO and the change in CFO in the same regression leads to the increase of $\bar{R}^2$ from 3.6% to 4.2%. Both estimated coefficients are positive and the null hypothesis can be rejected with 99% confidence. The relation between the models with regards to information content,

however, remains unchanged. Earnings and change in earnings still contain relatively more information value than CFO and change in CFO.

(M5) was developed to study what is the effect of disaggregating cash flow components. As emphasised in Chapter 3, aggregated variables force different cash flow components to have the same magnitude of effect, and opposing signs, while the capital markets and investors might value those components in different way. As such, the results show that decomposing FTE into CFO, CFI, NCF and ΔL has a positive effect on the association between cash flows and security returns. The multivariate regression on the disaggregated components reports $\bar{R}^2$=9.7%. The estimated coefficients are positive for CFO, CFI and NCF, and negative for ΔL, all being statistically significant at 1% level. The positive coefficients for CFO and NCF were expected. The positive association between CFI and security returns, despite CFI being a cash outflow from the company, signals that investors expect that the investments will generate positive net present value, and thus provide future benefits. The negative estimated coefficient on ΔL could mean that investors do not appreciate increase in leverage, as this could be associated with higher risk for the company. The higher $\bar{R}^2$ for the decomposed cash flows compared to earnings shows that the decomposed cash flow variables are more informative than the earnings for the one-year time windows in the researched period. This result is unexpected, and provides and interesting basis for further researching whether the association between decomposed cash flows and security returns is stronger than the association between decomposed earnings and security returns. This, however is not included in the scope of this thesis, thus we will suggest it as a direction for further research.

Coming back to our Hypotheses, the results above have the following effects:

- We have found evidence that earnings are more informative than cash flows from operations for both level of specifications variables, and level and changes in the specification variables. Hypothesis 1a [Accounting earnings (AE) are relatively more informative than cash flow from operations (CFO) over short measurement periods] is thus not rejected.
- We have found strong evidence that earnings are more informative than FTE for univariate regression models. However, when decomposing FTE into components, the results show that disaggregated cash flow variables have more relative information value than earnings. Hypothesis 1b [Accounting earnings (AE) are relatively more

informative than flow to equity measure (FTE) over short measurement periods] is therefore only partially rejected.

- We have found strong confirmation that earnings contain more information value compared to NCF over one year time windows. Hypothesis 1c [Accounting earnings (AE) are relatively more informative than net cash flows (NCF) over short measurement periods] is therefore not rejected.

### 7.1.2 Incremental Information Content of Cash Flow Variables over Earnings for Short Periods

Through hypotheses 2a-2c, we have predicted that Cash flows variables have information content beyond that of earnings for short periods of one year. This is tested through multivariate regression models (M8) – (M12) described in chapter 5. The results are reported in table 4. The regression models that we used in this section include both earnings and cash flow variables. To evaluate whether cash flow variables have incremental information content over earnings, we compare the $\bar{R}^2$ given by the multivariate regressions including both earnings and cash flows with the $\bar{R}^2$ that we obtained for the regression model where we used only earnings (M1) or earnings and change in earnings (M6). Additionally, for regression models with more than one cash flow measure – (M9) and (M12) – we employ a partial F-test to test if the incremental information added by the additional variables is significantly different from zero.

The results in all five models show an increase in $\bar{R}^2$ compared to earnings. $\bar{R}^2$ increased from 5.3% to 6.1% when adding CFO to the univariate regression including only AE. Both coefficients are positive and significantly different from zero at 1%. This implies that earnings and cash flow from operations convey different information to investors. While earnings could signal profitability, CFO might provide information about the capacity of the company to turn the earnings into actual cash flows. When adding change in earnings and change in cash flows from operations to the equation, we see that $\bar{R}^2$ further increases to 8.1% (compared to 5.9% for earnings and change in earnings), in line with previous research that argues for the inclusion of both level and change variables (Easton & Harris, 1991; Strong & Walker, 1993; Ali & Pope, 1995). The partial F-test for joint significance of CFO and ΔCFO impact gives a value of 21.86, which means the incremental value is statistically different from zero at 1% significance level. The coefficients for AE, ΔAE and CFO are all positive and significantly different from zero. The coefficient for ΔCFO is negative; however,

it is close to zero, and statistically insignificant. A similar result was obtained by Ali & Pope (1995) who obtain negative and insignificant coefficients for the ΔCFO in the regression model including the level of CFO and the change in CFO.

The results of (M10) illustrate that NCF has incremental informative value beyond earnings. $\bar{R}^2$ increases to 6.4%, and the coefficients are both positive and statistically different from zero with 99% confidence. This means that in the presence of earnings, investors gain additional information from the general ability of the company to generate cash after investments and transactions with equity and debt holders.

Table 4. Summary of results for tests analysing the incremental explanatory power of cash flows beyond earnings for security returns over time intervals of one year. (N=1796)

| Ind. Var. | | M8 | M9 | M10 | M11 | M12 |
|---|---|---|---|---|---|---|
| AE | Coefficient | 0.541*** | 0.414*** | 0.741*** | 0.864*** | 0.545*** |
| | (t-statistics) | (6.97) | (4.95) | (10.75) | (11.77) | (6.77) |
| CFO | Coefficient | 0.239*** | 0.453*** | | | 0.307*** |
| | (t-statistics) | (3.99) | (6.23) | | | (3.09) |
| NCF | Coefficient | | | 0.163*** | | 0.535*** |
| | (t-statistics) | | | (4.64) | | (8.47) |
| FTE | Coefficient | | | | -0.284*** | |
| | (t-statistics) | | | | (-6.19) | |
| CFI | Coefficient | | | | | 0.536*** |
| | (t-statistics) | | | | | (6.23) |
| ΔL | Coefficient | | | | | -0.417*** |
| | (t-statistics) | | | | | (-4.63) |
| ΔAE | Coefficient | | 0.284*** | | | |
| | (t-statistics) | | (4.79) | | | |
| ΔCFO | Coefficient | | -0.0201 | | | |
| | (t-statistics) | | (-0.25) | | | |
| | Intercept | 0.0993*** | 0.0763*** | 0.115*** | 0.114*** | 0.0458*** |
| | (t-statistics) | (7.36) | (5.51) | (9.05) | (9.03) | (3.23) |
| SSE | | 518.1 | 506.4 | 516.5 | 511.7 | 485.0 |
| F-value | | 59.11*** | 40.49*** | 62.10*** | 70.96*** | 49.66*** |
| $R^2_{Adj}$ (%) | | 6.1% | 8.1% | 6.4% | 7.2% | 11.9% |

( ): t-statistics in parentheses; ***, **, *: statistically significant at 1%, 5% and 10%, respectively;
AE – earnings; CFO – cash flow from operations; NCF – net change in cash and cash equivalents; FTE – flow to equity; CFI – investments; ΔL – net change in debt; ΔAE – change in earnings, compared to the previous year; ΔCFO – change in CFO, compared to the previous year. All variables are deflated by the opening price at the beginning of the year.
Source: Compiled by the authors from STATA outputs

Analysing FTE and earnings together, also provides an increase of $\bar{R}^2$ from 5.3% to 7.2%. The coefficient of FTE is negative, similar to the univariate regression including the flow to

equity variable. However, unlike the univariate regression, the coefficients for both earnings and flow to equity are significant at 1% level.

In line with our expectations, the decomposition of FTE into different cash variables adds most incremental value. The $\bar{R}^2$ for (M12) increases from 5.3% to 11.9%, thus implying that for short time intervals (one year), investor greatly benefit from a very comprehensive reporting package including earnings and different levels of cash flows. The estimated coefficients for the cash flow components have the same signs as in (M5), and all the coefficients are statistically different from zero at 1% significance level. The partial F-test on the added variables yields a value of 34.80 (also F-tests on each on them separately favour their relevance in the model), which is statistically significant.

The effect of these results on our Hypotheses 2a – 2c are as follows:

- Hypothesis 2a: Cash flow from operations (CFO) has incremental valuation content beyond accounting earnings (AE) over short measurement periods – We have found evidence that Cash flows from operations have incremental value for both earnings, and earnings and change in earnings models. Therefore, Hypothesis 2a is not rejected.
- Hypothesis 2b: Flow to equity measure (FTE) has incremental valuation content beyond accounting earnings (AE) over short measurement periods – Our results indicate that FTE has incremental information over earnings, both as a single variable, and decomposed. The decomposed FTE measure, including CFO, CFI, NCF and ΔL provide the most incremental value beyond earnings, resulting in the highest $\bar{R}^2$ for the regressions on the one year time interval. Thus, Hypothesis 2b is not rejected.
- Hypothesis 2c: Net cash flows (NCF) has incremental valuation content beyond accounting earnings (AE) over short measurement periods – The results of (M10) illustrate that NCF have some information content beyond that of earnings in explaining security returns. Hypothesis 2c is therefore not rejected.

## 7.2 Results for Long Time Intervals

Our study aims at providing evidence of association between accounting measures and security returns not just over the yearly fiscal period, but also over longer measurement periods. As we have mentioned earlier in this paper, we have studied the value relevance of earnings and cash flows for periods of two years and three years. In this section, we will

describe the results obtained for these periods. The following two subsections are aimed at testing hypotheses 3a – 3b and hypotheses 4a – 4b respectively.

### 7.2.1 Relative Information Content of Earnings and Cash Flow Measures over Long Periods

The relative information content of earnings and cash flow is measured through regression equations (M1) – (M7). These models will be used to test Hypothesis 3a and 3b over increasing time intervals of two years and three years. The results of (M1) – (M7) are reported in table 5.

The general expectation is that over increasing time intervals, the both earnings and cash flows overcome some of measurement errors and the matching and timing problems. Since we showed that in general, over short periods, earnings are more informative, we expect cash flows to catch up, and cut into the relative advantage of earnings.

Table 5. Summary of results for tests analysing the relative explanatory power of earnings and cash flows for security returns over time intervals of one year, two years and three years

| | | 1Y (N=1796) | | | 2Y (N=828) | | | 3Y (N=514) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model | Variable | Coef | t-stat | $\bar{R}^2$ | Coef | t-stat | $\bar{R}^2$ | Coef | t-stat | $\bar{R}^2$ |
| M1 | Intercept | 0.117*** | (9.20) | 5.3% | 0.117*** | (5.02) | 18.5% | 0.159*** | (3.44) | 29.4% |
| | AE | 0.690*** | (10.07) | | 1.235*** | (13.72) | | 1.947*** | (14.65) | |
| M2 | Intercept | 0.0888*** | (6.54) | 3.6% | 0.0328 | (1.19) | 11.9% | -0.0626 | (-1.11) | 24.7% |
| | CFO | 0.439*** | (8.24) | | 0.896*** | (10.63) | | 1.611*** | (13.02) | |
| M3 | Intercept | 0.124*** | (9.48) | 0.4% | 0.179*** | (7.31) | 5.0% | 0.345*** | (6.77) | 6.6% |
| | NCF | 0.102*** | (2.86) | | 1.243*** | (6.65) | | 2.228*** | (6.12) | |
| M4 | Intercept | 0.125*** | (9.53) | 0.1% | 0.169*** | (6.65) | 1.3% | 0.316*** | (5.94) | 2.8% |
| | FTE | -0.0772* | (-1.76) | | 0.623*** | (3.45) | | 1.048*** | (3.99) | |
| M5 | Intercept | 0.0335** | (2.35) | 9.7% | 0.0328 | (1.17) | 14.3% | -0.115** | (-2.01) | 28.8% |
| | CFO | 0.679*** | (8.09) | | 0.886*** | (6.00) | | 1.042*** | (4.59) | |
| | CFI | 0.380*** | (4.53) | | -0.0157 | (-0.10) | | 0.890*** | (3.13) | |
| | NCF | 0.493*** | (7.75) | | 0.689*** | (3.11) | | 1.739*** | (4.50) | |
| | ΔL | -0.224*** | (-2.59) | | 0.267 | (1.59) | | -0.449 | (-1.44) | |
| M6 | Intercept | 0.114*** | (8.92) | 5.9% | 0.105*** | (4.54) | 20.6% | 0.147*** | (3.31) | 35.1% |
| | AE | 0.694*** | (10.16) | | 1.238*** | (13.94) | | 1.674*** | (12.52) | |
| | ΔAE | 0.139*** | (3.66) | | 0.312*** | (4.78) | | 1.586*** | (6.77) | |
| M7 | Intercept | 0.0824*** | (6.03) | 4.2% | 0.0335 | (1.21) | 11.9% | -0.0654 | (-1.17) | 26.1% |
| | CFO | 0.459*** | (8.59) | | 0.868*** | (9.79) | | 1.466*** | (11.23) | |
| | ΔCFO | 0.211*** | (3.56) | | 0.123 | (1.02) | | 1.133*** | (3.24) | |

( ): t-statistics in parentheses; ***, **, *: statistically significant at 1%, 5% and 10%, respectively;
AE – earnings; CFO – cash flow from operations; NCF – net change in cash and cash equivalents; FTE – flow to equity; CFI – investments; ΔL – net change in debt; ΔAE – change in earnings, compared to the previous year; ΔCFO – change in CFO, compared to the previous year. All variables are deflated by the opening price at the beginning of the year.
Source: Compiled by the authors from STATA outputs

Therefore, we hypothesised that the relative informative value of cash flows compared to earnings will increase with increasing periods.

First, let us look into the benchmark – AE (M1). We see that $\bar{R}^2$ for the earnings variable is rising as we increase the time interval. Moving from the one year interval to the two-year interval, $\bar{R}^2$ shows an increase from 5.3% to 18.5%. The trend continues when switching from the two-year interval to the three-year interval; however, the increase is smaller, $\bar{R}^2$ reaching 29.4%. The estimated coefficient for earnings is significant at 1% level for all the return intervals considered, and is increasing as the interval is increased. This provides strong evidence that the explanatory power of earnings increases over time, in line with Dechow (1994), Charitou & Clubb (1999), Easton et al (1992) and others.

The findings for cash flows from operations (M2) show a large improvement in $\bar{R}^2$ as we increase the return period from one year to two years, and then three years. While for the short period (one year) $\bar{R}^2$ is only 3.6%, this number rises to 11.9% for the two year return window, and 24.7% for the three-year interval. The slope coefficient for CFO shows an increasing trend and is significant at 1% level over all return windows. This shows that the association between security returns and cash flows from operations strengthens as the return interval is increased. Relative to earnings, the increase in $\bar{R}^2$ for CFO is smaller for the second year, but shows a larger increase for the third year. The ratio $\bar{R}^2_{M2}/\bar{R}^2_{M1}$ goes from 0.68 for the one-year return interval to 0.84 for the three-year return interval. This leads us to believe that in general, there is a relative improvement in the association of CFO with security returns, compared to the association of AE with security returns, as the return interval is increasing.

Similar patterns can be observed when comparing (M6) and (M7), which include both level and change in AE and CFO. $\bar{R}^2_{M6}$ increases from 5.9% in the one year return window to 35.1% in the three-year return window. At the same time, $\bar{R}^2_{M7}$ rises from 4.2% to 26.1%. The ratio $\bar{R}^2_{M7}/\bar{R}^2_{M6}$ also shows a slight increase from 0.71 for the one year return interval to 0.74 for the three year interval. This provides further evidence that over time, the improvement in the explanatory power of CFO is relatively larger than the improvement in the explanatory power of earnings.

The findings for the net cash flow variable (NCF) in (M3) indicate a large improvement in $\bar{R}^2$ with increasing time intervals, from 0.4% (one-year intervals) to 5% (two-year intervals) and

6.6% (three-year intervals). The estimated slope coefficient is increasing and statistically significant at 1% level for all the time windows that we have considered. Overall, this points to the fact that over longer intervals, the net cash flows have some explanatory power for security returns. This is in line with Charitou & Clubb (1999), who indicate that building cash could be an indicator of either future positive NPV investments, or of lower risk associated with the company. The improvement over increasing time windows relative to earnings, identified for cash flows from operations, also holds for NCF.

Finally, the findings for the flow to equity measure show an increasing association with security returns over longer time intervals. However, the $\bar{R}^2$ for the three year interval is still at a low 2.8%, which implies that the association of FTE to security returns is very limited. This is not the case if we consider the decomposed cash flows values that add up to FTE. When disaggregating FTE into CFO, CFI, NCF and ΔL (M5), we obtain important improvements. $\bar{R}^2$ for (M5) rises from 9.7% (1 year interval) to 14.3% (2 year interval) and to 28.8% (3 year interval), thus indicating that the decomposed variables are valued more by the investors than the aggregated FTE variable. When compared to earnings, though, the informative value of the decomposed FTE seems to be not keeping up with the increase in explanatory power of earnings, when the return interval is increased.

Using the results presented in this subsection, we now consider the effect on our research hypotheses 3a and 3b:

- Hypothesis 3a: contemporaneous association of stock returns (RET) with cash flow from operations (CFO) improves relative to the contemporaneous association of stock returns (RET) with earnings (AE) as the measurement interval is increased – We have found evidence that the explanatory power of CFO improves relative to the explanatory power of earnings for explaining security returns over long intervals. This is valid both when considering only levels of the specification variables, and when including levels and changes of the specification variables. Therefore, Hypothesis 3a is not rejected.
- Hypothesis 3b: contemporaneous association of stock returns (RET) with disaggregated flow to equity measure (into CFO, CFI, NCF and ΔL) improves relative to the contemporaneous association of stock returns (RET) with earnings (AE) as the measurement interval is increased – our results show that the explanatory power of

the decomposed FTE variable shows a relative decrease compared to the explanatory power of earnings over long periods. Hypothesis 3b is thus rejected.

### 7.2.2 Incremental Information Content of Cash Flow Variables over Earnings for Long Periods

Hypotheses 4a and 4b predict that the incremental informative value of cash flows beyond earnings will decrease over time. Over long periods, we expect that cash flow variable (e.g. CFO, FTE, or decomposed FTE) does not have incremental information content in addition to earnings. This was tested through the regressions (M8) – (M12), performed over return windows of one year, two years and three years. The results of these regressions are reported in table 6.

Table 6. Summary of results for tests analysing the incremental explanatory power of cash flows over earnings for security returns over time intervals of one year, two years and three years

| | | 1Y (N=1796) | | | 2Y (N=828) | | | 3Y (N=514) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model | Variable | Coef | t-stat | R2 | Coef | t-stat | R2 | Coef | t-stat | R2 |
| M8 | Intercept | 0.0993*** | (7.36) | 6.1% | 0.0737*** | (2.75) | 19.3% | 0.0159 | (0.29) | 32.3% |
| | AE | 0.541*** | (6.97) | | 1.007*** | (8.77) | | 1.362*** | (7.65) | |
| | CFO | 0.239*** | (3.99) | | 0.327*** | (3.16) | | 0.773*** | (4.81) | |
| M9 | Intercept | 0.0763*** | (5.51) | 8.1% | 0.0517* | (1.92) | 21.8% | -0.0321 | (-0.62) | 39.6% |
| | AE | 0.414*** | (4.95) | | 0.966*** | (8.40) | | 0.928*** | (5.14) | |
| | ΔAE | 0.284*** | (4.79) | | 0.458*** | (4.78) | | 1.734*** | (6.99) | |
| | CFO | 0.453*** | (6.23) | | 0.435*** | (3.82) | | 0.917*** | (5.59) | |
| | ΔCFO | -0.0201 | (-0.25) | | -0.347** | (-2.04) | | 0.300 | (0.88) | |
| M10 | Intercept | 0.115*** | (9.05) | 6.4% | 0.119*** | (5.14) | 19.1% | 0.164*** | (3.54) | 29.8% |
| | AE | 0.741*** | (10.75) | | 1.148*** | (12.03) | | 1.847*** | (13.04) | |
| | NCF | 0.163*** | (4.64) | | 0.488*** | (2.66) | | 0.676** | (2.00) | |
| M11 | Intercept | 0.114*** | (9.03) | 7.2% | 0.123*** | (5.27) | 19.1% | 0.172*** | (3.75) | 31.1% |
| | AE | 0.864*** | (11.77) | | 1.354*** | (13.50) | | 2.253*** | (14.53) | |
| | FTE | -0.284*** | (-6.19) | | -0.486*** | (-2.66) | | -0.971*** | (-3.72) | |
| M12 | Intercept | 0.0458*** | (3.23) | 11.9% | 0.0665** | (2.42) | 20.2% | -0.0467 | (-0.85) | 36.6% |
| | AE | 0.545*** | (6.77) | | 0.965*** | (7.88) | | 1.529*** | (7.98) | |
| | CFO | 0.307*** | (3.09) | | 0.127 | (0.74) | | -0.351 | (-1.27) | |
| | CFI | 0.536*** | (6.23) | | 0.283* | (1.80) | | 1.567*** | (5.57) | |
| | NCF | 0.535*** | (8.47) | | 0.615*** | (2.88) | | 1.582*** | (4.33) | |
| | ΔL | -0.417*** | (-4.63) | | -0.128 | (-0.75) | | -1.379*** | (-4.35) | |

( ): t-statistics in parentheses; ***, **, *: statistically significant at 1%, 5% and 10%, respectively;
AE – earnings; CFO – cash flow from operations; NCF – net change in cash and cash equivalents; FTE – flow to equity; CFI – investments; ΔL – net change in debt; ΔAE – change in earnings, compared to the previous year; ΔCFO – change in CFO, compared to the previous year. All variables are deflated by the opening price at the beginning of the year.
Source: Compiled by the authors from STATA outputs

The incremental value of cash flow variables will be assessed by comparing $\bar{R}^2$ of models including both cash flow variables and earnings (M8) – (M12), with the $\bar{R}^2$ of models including only earnings variables (M1) and (M6)[25]. The results for the latter ones have been described in the previous subsection.

The findings for (M8) suggest that CFO has incremental informative value beyond earnings, even for longer periods. The $\bar{R}^2$ for (M8) for two year return intervals is 19.3%, and rises to 32.3% for the three year intervals. These values are higher than (M1), which reports $\bar{R}^2$ of 18.5% for the two year window, and 29.4% for the three year window. The coefficients for both AE and CFO in (M8) are positive and increasing, while being significant at 1% level for all the return windows. Taking into account also the changes in CFO and AE, we see that the incremental value is even higher. $\bar{R}^2$ in (M9) rises from 8.1% (1 year interval) to 21.8% (2 year interval) and to 39.6% (3 year interval). Comparatively, when only considering earnings and change in earnings (M6) for the same periods, $\bar{R}^2$ increases from 5.9% to 20.6% and 35.1%. The partial F-test for the two added variables (CFO and ΔCFO) shows a result of 20.21 for the three year interval, and 7.35 for the two year interval, which means that the increase is significant at 1% level. We can therefore conclude that even over longer periods, CFO still has incremental value beyond that of earnings. This means that over long term, investors value both earnings, and the firm's ability to generate cash flows from operations.

The results for the multivariate regression including change in cash and cash equivalents (NCF) and earnings (AE) show that over long periods, NCF's incremental value over earnings is very limited. (M10) reports $\bar{R}^2$ of 19.1% for the two year return interval (compared to 18.5% for earnings) and 29.8% for the three year return window (compared to 29.4% for earnings). Even though the coefficients for both NCF and AE are positive and significant, we assess that net cash flows do not provide incremental information content beyond earnings over long periods.

The findings for FTE show that over long periods, FTE might have some incremental value beyond earnings for explaining security returns. While for the two-year return interval the incremental value is marginal ($\bar{R}^2$ of 19.1% compared to 18.5% only for earnings), for the three-year windows, $\bar{R}^2$ for (M11) rises to 31.1%, compared to 29.4% for earnings. The incremental value shows a further increase when decomposing FTE into CFO, CFI, NCF and

[25] (M6) includes also the changes in earnings, so it will only be used to compare with (M9), which includes changes in cash flows from operations.

ΔL. $\bar{R}^2$ for model (M12) is 20.2% for the two year return interval, and 36.6% for the three year return interval. The partial F-test shows a value of 5.44 for two year intervals and 15.56 for three year intervals, which means the increase in $\bar{R}^2$ is significant. Over long periods, the estimated coefficient for CFO becomes less significant, which might indicate that providing information about investments and net change in cash balance over long periods is more important than providing information about CFO. This finding is consistent with the results in Penamn & Yehuda (2009), who report that while Free Cash Flows (FCF=CFO+CFI) have information content incremental to earnings, when considering earnings and disaggregated components of FCF – CFO and CFI – equity returns become unrelated to cash flows from operating activities. This is somewhat contradicting the results that we obtained for (M8) and (M9), which showed that CFO has incremental value over earnings. The reason might be that over long periods, the CFO in these two models actually stands as a proxy for the cash available for investments. Thus, the good news associated with net present value investments is contained in CFO. This is no longer the case when showing both CFO and CFI, since investors can now evaluate the CFI component individually.

Overall, we see that most cash variables maintain incremental information content beyond earnings for explaining security returns even over longer periods. These results have the following effect on our hypotheses 4a and 4b:

- Hypothesis 4a: Given the association of security returns and accounting earnings, cash flow from operations (CFO) does not have incremental information content over long return intervals. Our results showed that even over periods of two years and three years, the cash flows from operations and change in cash flow from operations still maintain incremental informative value beyond earnings. Therefore, hypothesis 4a is rejected.
- Hypothesis 4b: Given the association of security returns and accounting earnings, flow to equity measure (FTE) does not have incremental information content over long return intervals. The empirical results indicate that both aggregated and decomposed FTE contain incremental information value beyond earnings for long periods. This is especially the case for the decomposed variables, when $\bar{R}^2$ shows a larger increase. Therefore, hypothesis 4b is rejected.

## 7.3 Does IFRS Affect the Relevance of Earnings?

Given the fact that during the period that we researched a major regulatory change has happened in Sweden – the adoption of IFRS[26] in 2005 – it might be worthwhile to investigate whether this had any impact on our results. The focus will be mainly on earnings, since the adoption of IFRS should not have had any impact on the cash flows figures reported by companies. To test whether the explanatory power of earnings has improved with the adoption of the IFRS, we compare the $\bar{R}^2$ for yearly regression on earnings (M1) before and after the adoption of IFRS. The results are presented in table 7.

Table 7. Results of the simple regression of annual security returns on AE

| | AE | | Intercept | | | |
|---|---|---|---|---|---|---|
| | Coef | (t-stat) | Coef | (t-stat) | N | $\bar{R}^2$ |
| 1998 | 1.921*** | (3.42) | -0.0699 | (-1.40) | 108 | 9.1% |
| 1999 | 1.219*** | (3.45) | 0.262*** | (5.32) | 116 | 8.7% |
| 2000 | 0.979*** | (3.46) | -0.00220 | (-0.05) | 143 | 7.2% |
| 2001 | 1.180*** | (7.19) | -0.0960*** | (-2.98) | 151 | 25.3% |
| 2002 | 1.165*** | (7.27) | -0.219*** | (-7.85) | 160 | 24.6% |
| 2003 | 0.427*** | (2.62) | 0.414*** | (9.30) | 161 | 3.5% |
| 2004 | 0.525*** | (3.45) | 0.254*** | (7.54) | 161 | 6.4% |
| 2005 | 0.697*** | (3.69) | 0.470*** | (12.99) | 159 | 7.4% |
| 2006 | 2.262*** | (7.46) | 0.178*** | (5.29) | 158 | 25.8% |
| 2007 | 1.031*** | (4.87) | -0.113*** | (-4.25) | 162 | 12.3% |
| 2008 | 0.138 | (1.03) | -0.442*** | (-23.31) | 162 | 0.0%[27] |
| 2009 | 0.466*** | (2.74) | 0.614*** | (13.30) | 155 | 4.1% |

( ): t-statistics in parentheses; ***, **, *: statistically significant at 1%, 5% and 10%, respectively;
AE – earnings deflated by the opening price at the beginning of the year.
Source: Compiled by the authors from STATA outputs

The results for years 1998-2004[28] are prior to the IFRS adoption, while results for years 2005-2009 are after the adoption of IFRS. While there is a slight increase in $\bar{R}^2$ from 6.4% in 2004 to 7.4% in 2005, the results do not seem to provide concluding arguments. In 2006 and 2007, $\bar{R}^2$ rises to 25.8% and 12.3%, respectively. However, large $\bar{R}^2$ have also been shown for years 2001 and 2002 (25.3% and 24.6%, respectively). We further investigate the effect of IFRS introduction considering two year return periods (results reported in table 8):

[26] For convenience, the term IFRS refers both to International Accounting Standards (IAS) and to International Financial Reporting Standards (IFRS)
[27] The low adjusted $\bar{R}^2$ for 2008 can be explained by global economic downturn
[28] In our dataset, the results for 2004 have not been restated in accordance with IFRS.

Table 8. Results of the simple regression of two year security returns on AE

| | AE | | Intercept | | | |
|---|---|---|---|---|---|---|
| | Coef | (t-stat) | Coef | (t-stat) | N | $\bar{R}^2$ |
| 1998-99 | 1.212** | (2.25) | 0.150 | (1.51) | 91 | 4.3% |
| 2000-01 | 1.453*** | (7.08) | -0.0961 | (-1.56) | 132 | 27.3% |
| 2002-03 | 0.785*** | (6.32) | 0.0413 | (1.05) | 154 | 20.3% |
| 2004-05 | 1.273*** | (5.47) | 0.666*** | (10.46) | 146 | 16.6% |
| 2006-07 | 1.685*** | (8.25) | 0.0116 | (0.25) | 147 | 31.5% |
| 2008-09 | 0.396*** | (2.63) | -0.132*** | (-4.35) | 158 | 3.6% |

( ): t-statistics in parentheses; ***, **, *: statistically significant at 1%, 5% and 10%, respectively;
AE – earnings deflated by the opening price at the beginning of the year.
Source: Compiled by the authors from STATA outputs

The results for two years show that $\bar{R}^2$ is highest for the period 2006-2007, thus providing some evidence that IFRS has positively influenced the association between earnings and security returns. However, we see that $\bar{R}^2$ is also quite high in period 2000-2001, for example (most probably influenced by the high $\bar{R}^2$ in year 2001, as shown above). In addition, 2008-2009 exhibits a seemingly outlying $\bar{R}^2$ and coefficient values (most probably affected by the global financial downturn). These implications hinder us to conclude that IFRS has triggered a better association between earnings and security returns in Sweden.

One of the reasons that could be responsible for this finding is described as soft IFRS adoption by Hellman (2011):

> *Swedish-listed companies adopted IFRS 2005 in response to EU regulation 1606/2002. This was not expected to cause any dramatic change since Sweden had already adopted almost all prevailing IFRS into Swedish GAAP during 1991–2004.*

To sum up, we do not find any conclusive evidence that the adoption of IFRS in Sweden in 2005 has somehow influenced the association between security returns and earnings for companies listed in Sweden.

# 8 Summary and Conclusions

This paper empirically examined the relative and incremental information content of earnings and cash flows as the measurement interval is lengthened from one year to two and three years. The study built up multiple hypotheses, but they all had the same objective to investigate which accounting measures contain most information in signalling stock prices. In particular, we hypothesize that (i) accounting earnings overrule cash flow measures as relatively superior in providing value relevant information to the market, but this tendency is

mitigated over longer return intervals, as cash flow metrics improves relative to earnings; (ii) cash flows are associated with security returns, given earnings, but this might not hold over longer measurement periods, as earnings explanatory value increases.

The findings based on Swedish listed companies over the period 1998-2009, indicate that both earnings and cash flows have explanatory power for security returns. The univariate regression results point out that accrual-based earnings measure is relatively more informative comparative to cash flows from operations, net cash flows or flow to equity. This is valid both for short time measurement windows (one year) and for long period measurement windows (two years and three years). However, the relative advantage of earnings compared to individual cash flow variables is decreasing as the return interval under consideration is expanded. A particularity of our study is that we consider both cash flows for the company, but also cash flows to equity holders (FTE). While the results for the aggregate FTE measure show limited value of the FTE (even over increasing periods), deriving FTE from individual cash flows (CFO-CFI+ΔL-NCF) and analysing this disaggregated variable provides an important conclusion for our study: disaggregated cash flow measures analysed in multivariate regression have more explanatory power for explaining security returns compared to earnings over intervals of one year, which provides evidence of the benefit of analysing decomposed variables, instead of aggregate ones. The fact that explanatory power of CFO increases over longer intervals and FTE (both aggregated and disaggregated) does not show relative improvement to earnings over two- and three-year intervals, only partly proves economic importance of accruals.

For both short and long return intervals, the information content improves with the inclusion of both earnings and cash flow components in the analysis, thus indicating that cash flows have explanatory power incremental to earnings for explaining security returns. The results in prior studies on US and UK data provided inconclusive evidence of the incremental explanatory power of cash flows, thus we contribute to strengthening the view that cash flows contain information beyond earnings. As the measurement window is lengthened, both cash flow from operations and FTE (disaggregated) remain strong in adding explanatory value to the information contained in earnings. This indicates that those measures provide valuation relevant information that is not contained in earnings.

In addition, we have analysed if the adoption of IFRS in Sweden has brought any changes to the association between earnings and security returns, however, no conclusive evidence has

been found. This might be explained by the voluntary convergence of Swedish GAAP and IFRS in the period between 1991 and 2004.

In summary, the results of our study present strong evidence for the value relevance of both earnings and cash flow variables. The regard of earnings as the dominant metrics in the marketplace seems to be justified by the superiority of earnings over cash flows. However, we also indicate that the information content of cash flows should not be disregarded. The increase of explanatory power relative to earnings over long intervals indicates that cash flows can provide valuable information to investors, especially when disaggregated into individual components. Additionally, there is clear evidence that cash flow variables have incremental value over earnings, so it would be worthwhile considering them together. The increased information content over longer time intervals for both earnings and cash flows was to be expected, according to the theoretical association between security returns and accounting metrics.

In conclusion, the findings in this thesis could be of interest to investors, particularly international investors interested in investing in Swedish stocks. From the standard-setting perspective, the continuous effort of Accounting Regulatory Bodies to improve the quality of earnings is justified by their association with security returns. Similarly, if the valuation relevance is the criteria for evaluating the importance of different accounting measures, then our results also indicate that cash flow metrics also play an important role in financial reporting.

# 9 Limitations of the Study and Suggestions for Further Research

In this part, the main delimitations and several possible future extensions of the above study are briefly outlined.

Delimitations:

- Data limitations restrict us from conducting the research on quarterly and four-year measurement intervals that could provide even stronger evidence with regards to the phenomena hypothesized and observed in this thesis.
- The model specifications do not control for such factors as company size, industry, market specificities.

- The sample is restricted to the companies that are listed on the Stockholm Stock Exchange that are not representative of all industries and companies that satisfied strict data availability requirements. This limits the ability to generalize the findings to the whole population of companies in the Swedish market.

Areas of the suggested future research:

- In this study, the market value of the company, as measured by the stock price, is assumed to be representative of the fundamental equity value. Thus, the explanatory power of earnings and cash flow measures could be researched on the fundamental value measure which is based on popular valuation techniques (e.g. discounted dividend model).
- The disaggregation of the bottom-line earnings into income statement components could render more insights about valuation relevance of accounting metrics that are required to be reported in the financial statements and how those composite earnings metrics affect informativeness of cash flow measures.
- By introducing accounting variables that represent accruals (working capital, non-current accruals) in the regression modelling could help draw more explicit conclusions about the importance of accrual accounting.
- Introduction of earnings permanence concept into models could help understand what accounting measures explain stock returns better when, for instance, earnings are transitory in nature (extreme in their value as compared to earnings of, e.g. other companies).
- Future thesis papers could delve in interpretation of coefficients on the accounting measure variables that are reported in the tables of chapter 7 and also relate to the theoretical background explained in chapter 3. This would allow drawing more conclusions on this important topic, e.g. about economic earnings.
- Some research indicates that non-linearity in return-earnings association is possible. Therefore, the re-estimated results in the new statistical specifications might render different findings.
- By applying corrective measures to the above-mentioned limitations, one could naturally extend the study in potentially fruitful areas.

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# 11 Appendix

Table 9. Pearson Correlations for the period 1998-2009

Panel A: One-year interval

| | RET | AE | CFO | CFI | NCF | FTE | ΔL | ΔAE |
|---|---|---|---|---|---|---|---|---|
| RET | 1 | | | | | | | |
| AE | 0.2314* | 1 | | | | | | |
| | 0.000 | | | | | | | |
| CFO | 0.1909* | 0.4788* | 1 | | | | | |
| | 0.000 | 0.000 | | | | | | |
| CFI | 0.1212* | -0.0613* | -0.1690* | 1 | | | | |
| | 0.000 | 0.0094 | 0.000 | | | | | |
| NCF | 0.0674* | -0.1613* | -0.6003* | 0.3514* | 1 | | | |
| | 0.0043 | 0.000 | 0.000 | 0.000 | | | | |
| FTE | -0.0415 | 0.3829* | 0.7063* | -0.4391* | -0.8369* | 1 | | |
| | 0.079 | 0.000 | 0.000 | 0.000 | 0.000 | | | |
| ΔL | -0.0058 | -0.1752* | -0.6963* | 0.6410* | 0.8121* | -0.6814* | 1 | |
| | 0.8062 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | | |
| ΔAE | 0.0801* | -0.0159 | -0.4273* | 0.1529* | 0.4289* | -0.3973* | 0.4332* | 1 |
| | 0.0007 | 0.4994 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| ΔCFO | 0.0620* | -0.1257* | -0.1032* | 0.1996* | 0.3843* | -0.3009* | 0.2987* | 0.6284* |
| | 0.0086 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

*: statistically significant at 1%

AE – earnings; CFO – cash flow from operations; NCF – net change in cash and cash equivalents; FTE – flow to equity; CFI – investments; ΔL – net change in debt; ΔAE – change in earnings, compared to the previous year; ΔCFO – change in CFO, compared to the previous year. All variables are deflated by the opening price at the beginning of the year.

Source: Compiled by the authors from STATA outputs

Panel B: Two-year interval

| | RET | AE | CFO | CFI | NCF | FTE | ΔL | ΔAE |
|---|---|---|---|---|---|---|---|---|
| RET | 1 | | | | | | | |
| AE | 0.4309* | 1 | | | | | | |
| | 0.000 | | | | | | | |
| CFO | 0.3469* | 0.6266* | 1 | | | | | |
| | 0.000 | 0.000 | | | | | | |
| CFI | 0.1562* | 0.1865* | 0.3151* | 1 | | | | |
| | 0.000 | 0.000 | 0.000 | | | | | |
| NCF | 0.2254* | 0.3418* | 0.2919* | -0.1263* | 1 | | | |
| | 0.000 | 0.000 | 0.000 | 0.0003 | | | | |
| FTE | 0.1192* | 0.4491* | 0.4357* | -0.0693 | -0.016 | 1 | | |
| | 0.0006 | 0.000 | 0.000 | 0.0461 | 0.6458 | | | |
| ΔL | 0.0061 | -0.0318 | -0.2816* | 0.6570* | -0.005 | -0.0325 | 1 | |
| | 0.8617 | 0.3614 | 0.000 | 0.000 | 0.8852 | 0.3506 | | |
| ΔAE | 0.1449* | -0.0073 | -0.0107 | -0.0209 | -0.0950* | -0.0491 | -0.0749 | 1 |
| | 0.000 | 0.8334 | 0.7574 | 0.5489 | 0.0062 | 0.1585 | 0.0311 | |
| ΔCFO | 0.1390* | 0.1032* | 0.3093* | 0.1463* | 0.0844 | -0.0207 | -0.1114* | 0.6924* |
| | 0.0001 | 0.0029 | 0.000 | 0.000 | 0.0152 | 0.5528 | 0.0013 | 0.000 |

*: statistically significant at 1%
AE – earnings; CFO – cash flow from operations; NCF – net change in cash and cash equivalents; FTE – flow to equity; CFI – investments; ΔL – net change in debt; ΔAE – change in earnings, compared to the previous year; ΔCFO – change in CFO, compared to the previous year. All variables are deflated by the opening price at the beginning of the year.
Source: Compiled by the authors from STATA outputs

Panel C: Three-year interval

| | RET | AE | CFO | CFI | NCF | FTE | ΔL | ΔAE |
|---|---|---|---|---|---|---|---|---|
| RET | 1 | | | | | | | |
| AE | 0.5434* | 1 | | | | | | |
| | 0.000 | | | | | | | |
| CFO | 0.4987* | 0.6827* | 1 | | | | | |
| | 0.000 | 0.000 | | | | | | |
| CFI | 0.2608* | 0.2129* | 0.2814* | 1 | | | | |
| | 0.000 | 0.000 | 0.000 | | | | | |
| NCF | 0.2609* | 0.3527* | 0.2710* | -0.1244* | 1 | | | |
| | 0.000 | 0.000 | 0.000 | 0.0047 | | | | |
| FTE | 0.1735* | 0.5316* | 0.5790* | -0.1022 | -0.0252 | 1 | | |
| | 0.0001 | 0.000 | 0.000 | 0.0204 | 0.5691 | | | |
| ΔL | -0.0351 | -0.0439 | -0.3079* | 0.7074* | -0.0438 | -0.1677* | 1 | |
| | 0.4272 | 0.3211 | 0.000 | 0.000 | 0.3217 | 0.0001 | | |
| ΔAE | 0.3933* | 0.3013* | 0.0942 | -0.0458 | 0.1280* | 0.0291 | -0.0856 | 1 |
| | 0.000 | 0.000 | 0.0327 | 0.2999 | 0.0036 | 0.51 | 0.0525 | |
| ΔCFO | 0.2862* | 0.2105* | 0.3423* | 0.1243* | 0.2000* | 0.0253 | -0.1313* | 0.3617* |
| | 0.000 | 0.000 | 0.000 | 0.0048 | 0.000 | 0.5679 | 0.0029 | 0.000 |

*: statistically significant at 1%

AE – earnings; CFO – cash flow from operations; NCF – net change in cash and cash equivalents; FTE – flow to equity; CFI – investments; ΔL – net change in debt; ΔAE – change in earnings, compared to the previous year; ΔCFO – change in CFO, compared to the previous year. All variables are deflated by the opening price at the beginning of the year.

Source: Compiled by the authors from STATA outputs